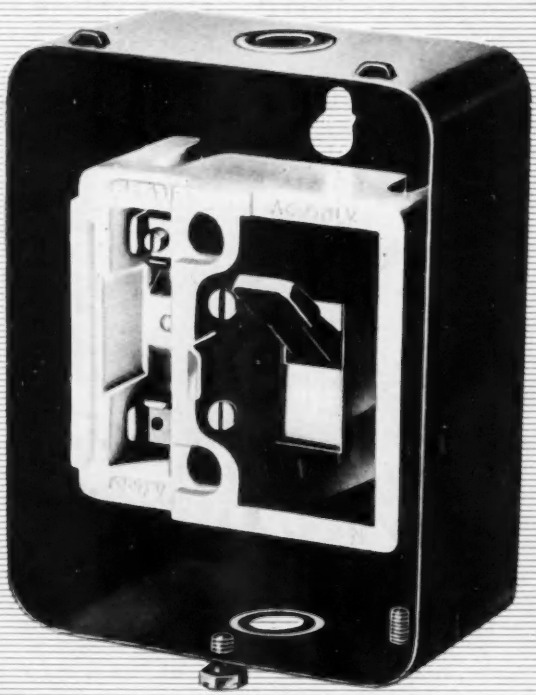
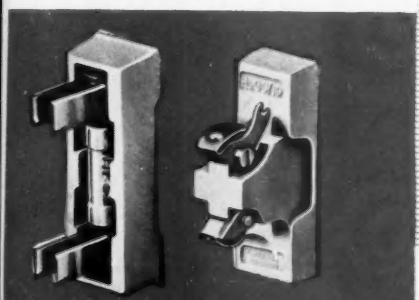
ELECTRICAL TIMES

THURSDAY
31 JULY
1952
NINEPENCE

NEW
right through

FOR SINGLE POLE AND NEUTRAL DUTY





Choose between cartridge or rewirable fuses. The Carriers are interchangeable.

MEMSPEL & MEMSPAN

are the steel-clad and all-insulated versions of an entirely new range of switch fuse gear designed by MEM for single pole and neutral installations. All the skill of MEM's design team has gone into this job. Outstanding features are extreme compactness and simplicity of wiring—slow break A.C. switch, choice of BS1361 cartridge or rewirable fuses with interchangeable carriers, and effective interlocking. Available in steel-clad and all-insulated units for 15, 30 and 60 amps including 2, 3 and 4 way splitters.

You will be delighted with the excellent design and fine workmanship, particularly when you check the attractive prices.

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Switch, fuse and motor control gear, electric fires and localised lighting equipment.

Send for the new Switchcraft catalogue (List No. 311) and full details of the new range.

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Branches in London and Manchester

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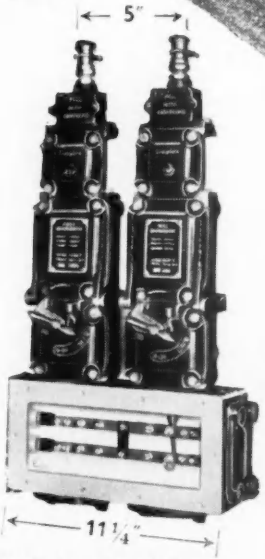
MINIATURE FLAMEPROOF SWITCHFUSES AND BUSBAR CHAMBERS

Compact adaptable Flameproof equipment designed to control small power circuits up to 15 amps at 250 volts in inflammable atmospheres



FLP

SWITCHFUSES

M. o. F. & P. Certificate Nos. FLP 2859/2860 (Buxton Certified) for Groups I, II and III Gases. 15 amp switches (A.C. only) with 5 or 15 amp. Cartridge Fuses are standard, but 5 amp switches for D.C. can be provided where specified. Fuse compartment cover is interlocked with switch mechanism, therefore fuses can be replaced without isolating the main supply. For use with armoured cable and/or conduit

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25 ft. M.H. Bracket Arm 18' 0" Outreach for Group 'A' Roads

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A folder showing our standard columns will be sent on application.

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A

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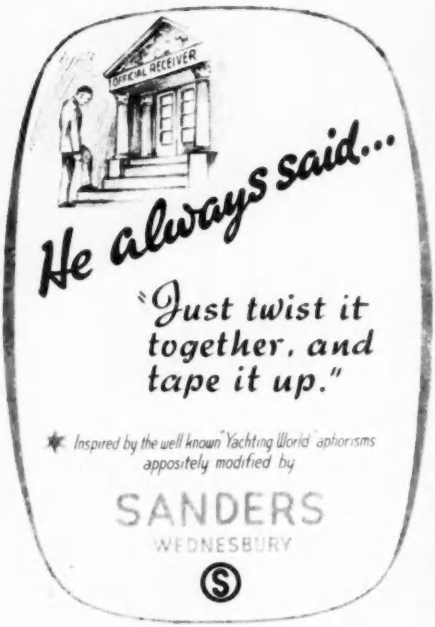
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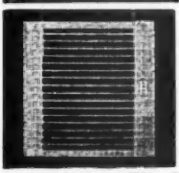

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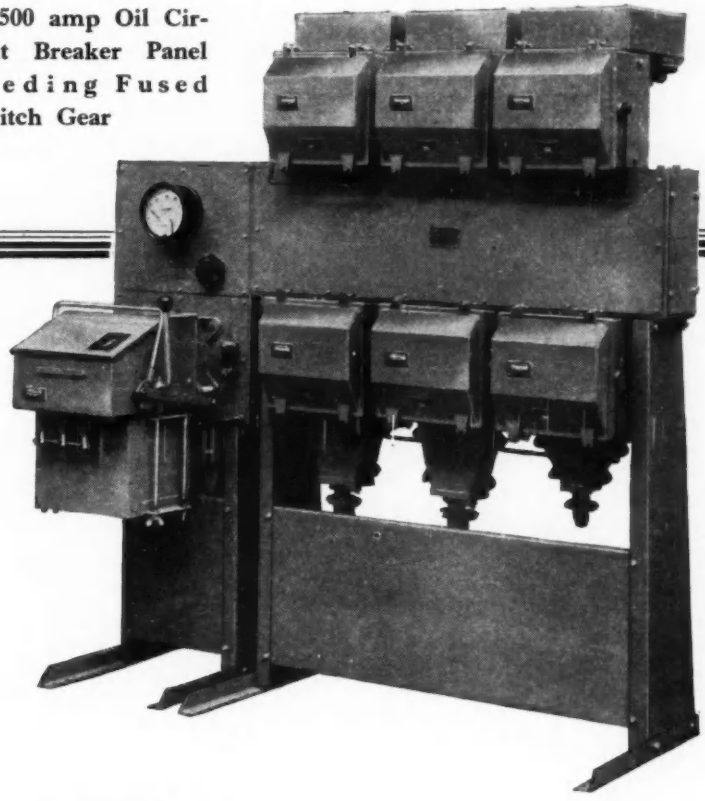
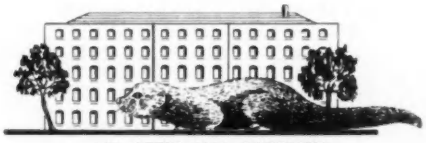
A 500 amp Oil Circuit Breaker Panel feeding Fused Switch Gear





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Write for Switchboard Catalogue SB 971

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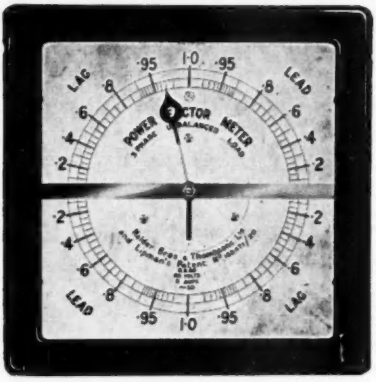

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POWER FACTOR METERS

Illustrations show N.C.S. Power Factor Meters. Switchboard Patterns, Square Type (SQS) and Round, 360 deg. scale, to B.S. Specification.

Independent of current, voltage frequency or temperature variations met with in commercial practice. Low volt-ampere consumption. Supplied for single phase and polyphase balanced or unbalanced loads. For balanced load systems instruments can be arranged to operate from one current transformer if desired.

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N.C.S. PRODUCTS include all types of Measuring Instruments, Indicating or Recording, Switchboard or Portable. Also Protective Relays, Vectormeters, Circuit Breakers, etc. Every unit is designed for maximum operating efficiency, reliability and durability, prices being competitive without sacrifice of quality.

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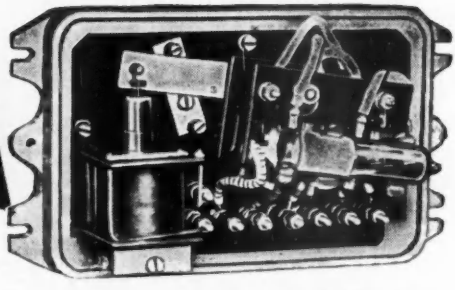

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for operating Mercury Switches up to 30 amp

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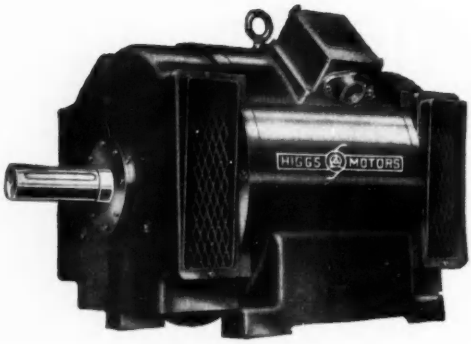

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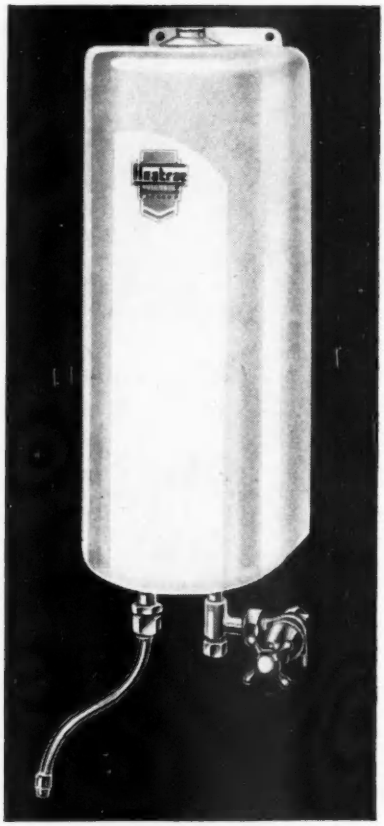
It is to this FACT that we attribute the preference for Heatrae by leading electrical undertakings everywhere.



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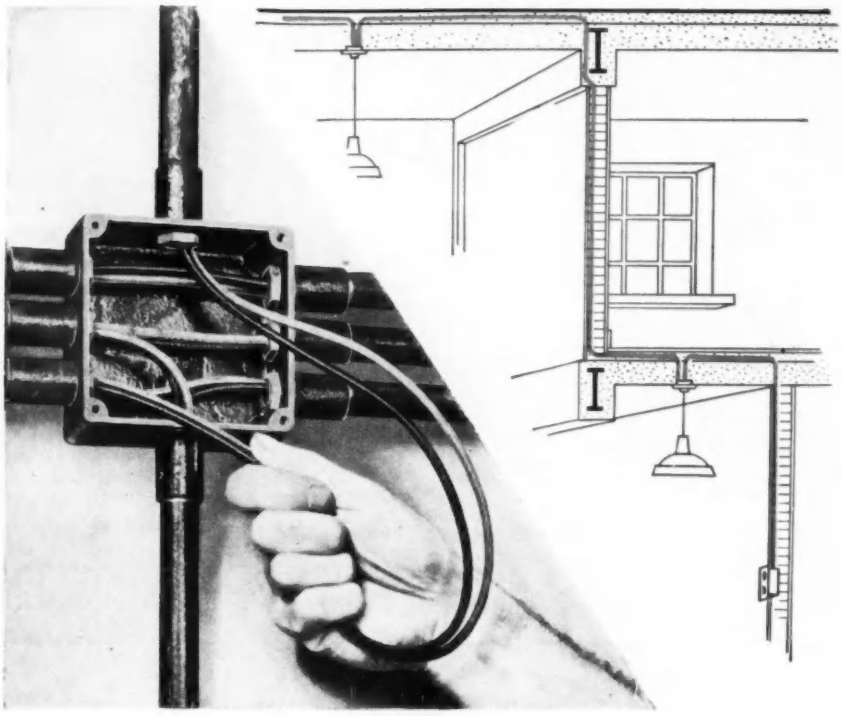

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Where trouble is experienced on machine tools due to suds getting into the lampholder, the sudsproof head with enclosed lampholder can be used instead of the standard head.

Various lengths of arm (maximum horizontal reach 54 in.). With pillar or short vertical pivot. Alternative sizes of reflector. Bases for wall, bench, ceiling, floor or for mounting direct on machines. Also portable types.

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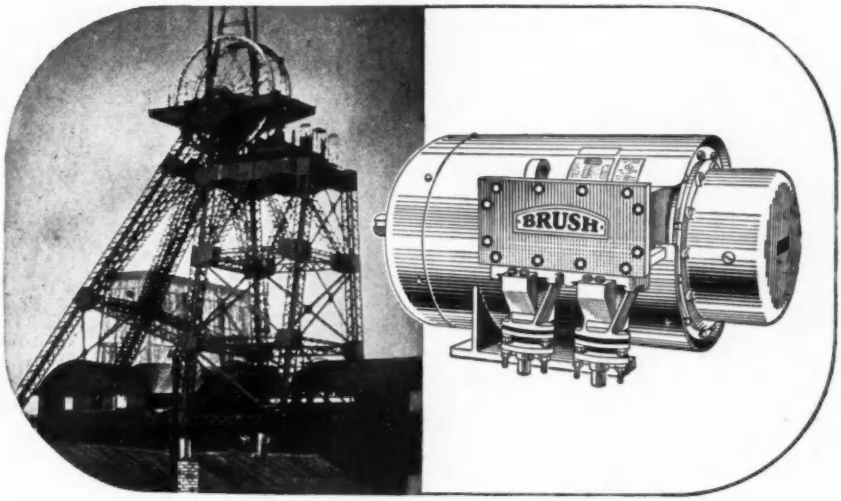
For 'any hazardous proximity'



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the best answer is **BRUSH**

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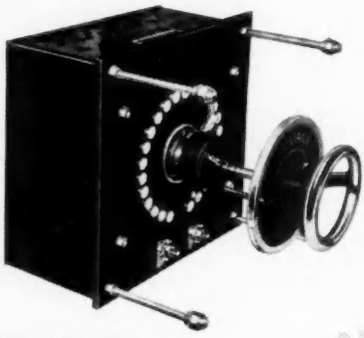

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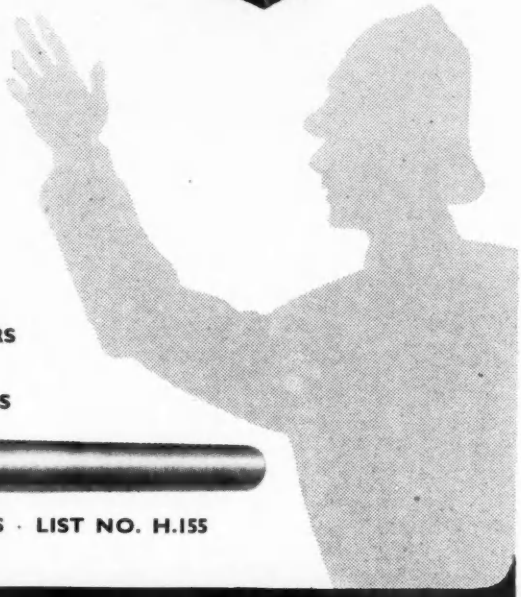

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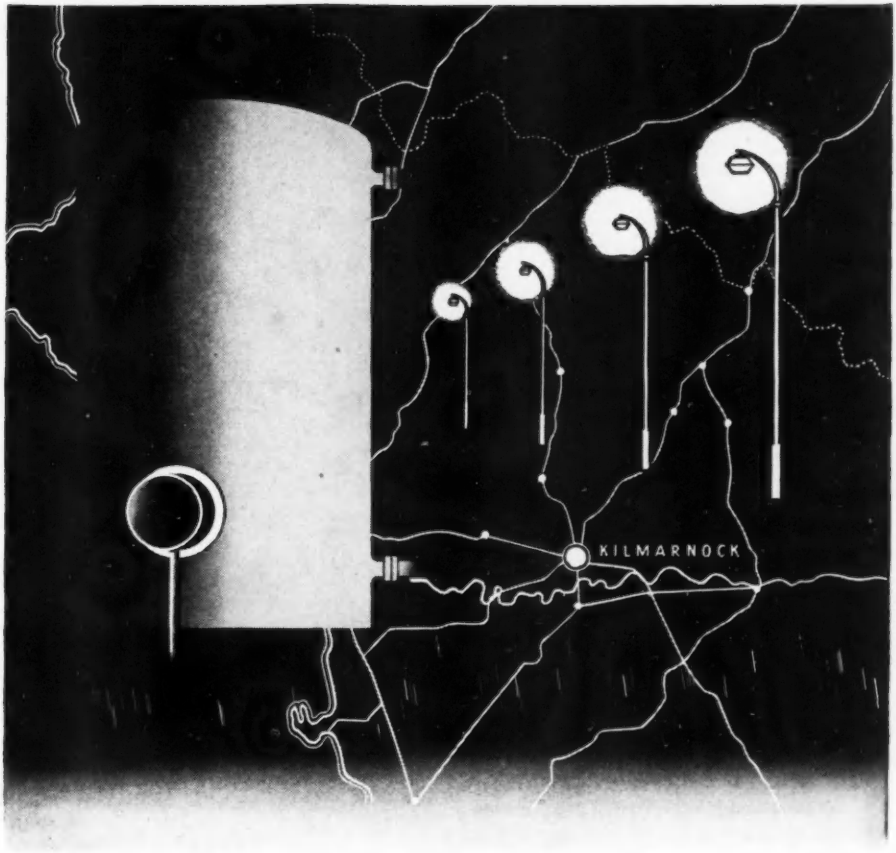

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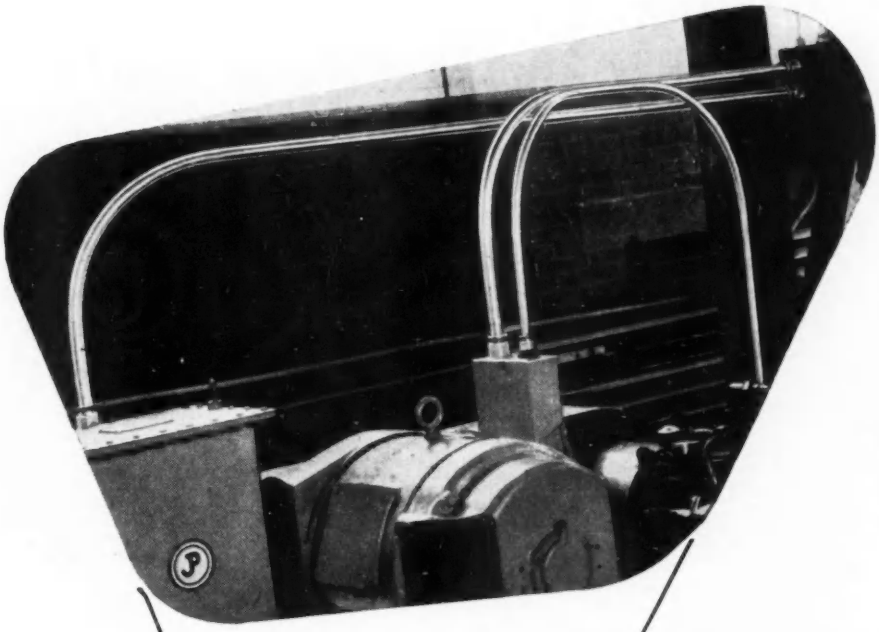

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. . . AND NO INVISIBLE MEANS EITHER! The strength and lightness of an aluminium sheath frequently eliminates the need for supporting structures—one more financial advantage of using

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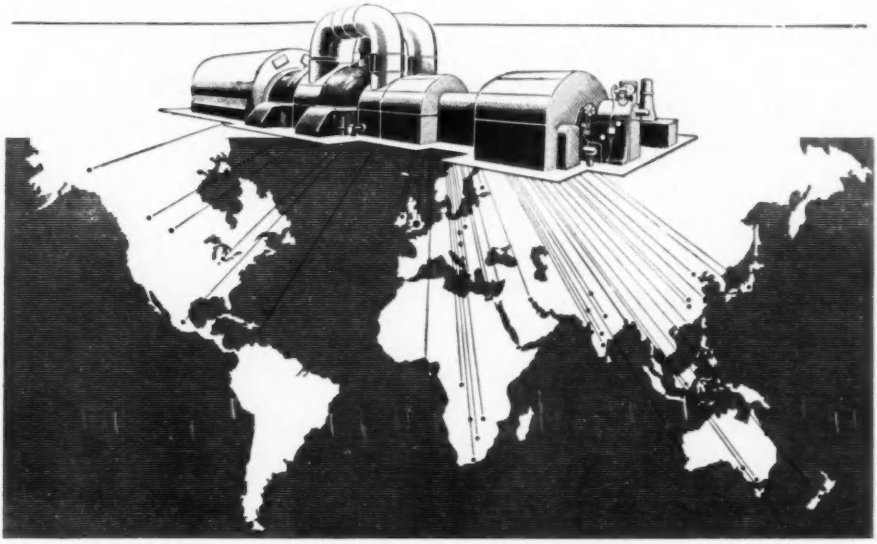
'ENGLISH ELECTRIC'

steam turbo-alternator sets



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The ENGLISH ELECTRIC Company has been designing and manufacturing steam turbo-generating plant of all types for Central Power Stations and industry for many years. This includes a wide range of machines with capacities up to 100,000 kW, hydrogen cooled, running at 3,000 r.p.m. and operating with steam conditions up to 1,500 p.s.i.g. and 1050° F.

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In almost every country throughout the world 'ENGLISH ELECTRIC' steam generating plant and its associated transmission and distribution equipment are providing electric power for industry and the home.

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Finger-tip control

OF **HOT WATER**

AND **CURRENT**

CONSUMPTION

The **Monmouth** AUTOMATIC ELECTRIC DUAL WATER HEATER

provides

1 **Quick-service hot water for sinks and basins**—adequate quantities for normal use in a matter of minutes after switching on—or, the thermostatically controlled top-element is kept switched on, **instantaneous hot water whenever required.**

2 **Ample supplies of really hot water for baths, etc.**—20 gallons of steaming hot water, simply by switching over to the lower element whenever you want a bath.

3 **The ability to switch off completely** for periods when no hot water is needed, so that you use NO electricity whatsoever.

—all combined in **one** handsome modern unit, thermally insulated. "Toddler-proof" control switch. Finished in easily cleaned cream enamel in keeping with modern kitchens. The MONMOUTH is easily and cheaply installed, and is made by SANTON.

Two models available: The "MONMOUTH," capacity 20 gallons, 33″ high x 19″ square; The "MONMOUTH JUNIOR," capacity 12 gallons, 27″ high x 17″ square.

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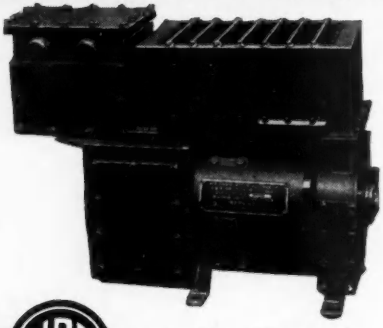
ELECTRICAL EQUIPMENT



H F Motor Alternator for Radar. Output 2 kW. 80 volts A.C. 1,500 cycles per second. Watertight. Fitted with Automatic Voltage Regulator.

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(Send for publication No. 1003)

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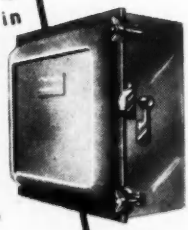

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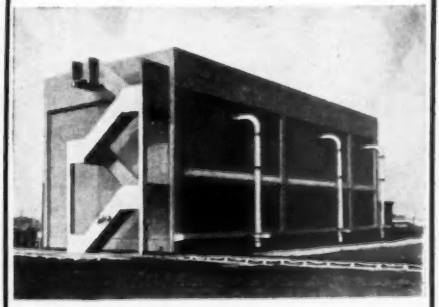

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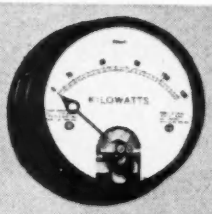

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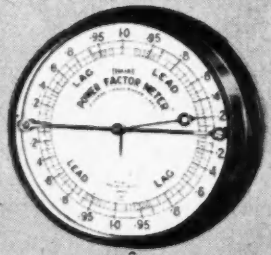

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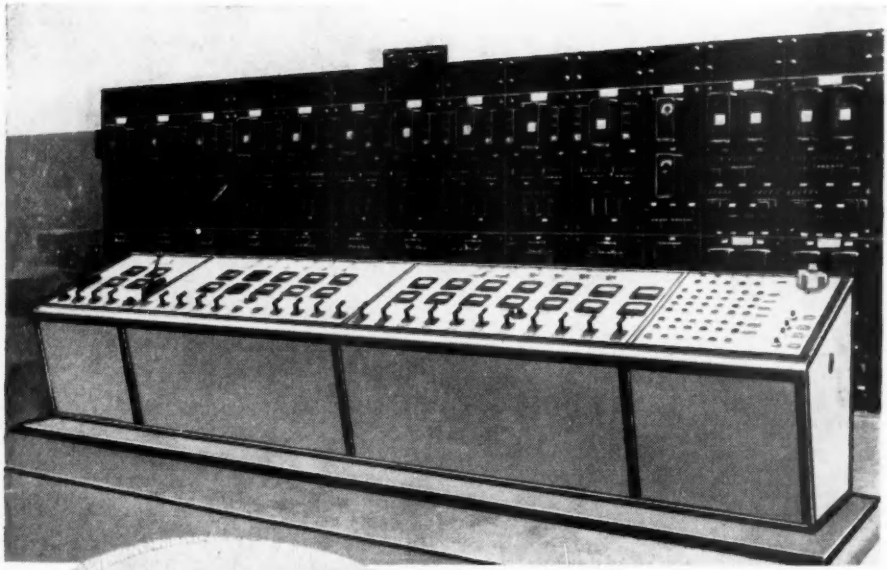

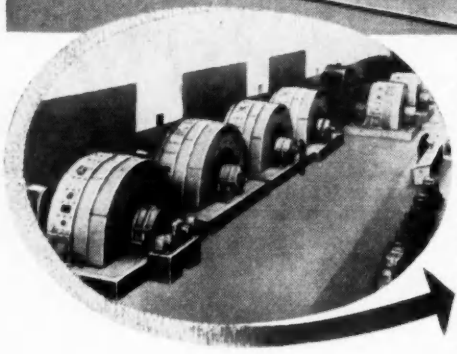

The upper illustration shows the supervisory control desk in the Motor room and a section of the control panels (in all approx. 195 ft. frontage) at the Abbey Works of The Steel Company of Wales, Ltd.—the largest rolling mill in Europe and the most modern in the world. BTH contactor equipments control the drives for the 80-inch 6-stand hot strip finishing mill, comprising six BTH motors totalling 28,000 h.p. (inset) supplied from BTH rectifiers with a total capacity of 21,000 kW. For more than half a century BTH has held a position of leadership in the development of automatic "fingertip" control of heavy electric plant through the medium of contactors. These contactors, designed by experts, are proved by protracted "life tests" before going into service.

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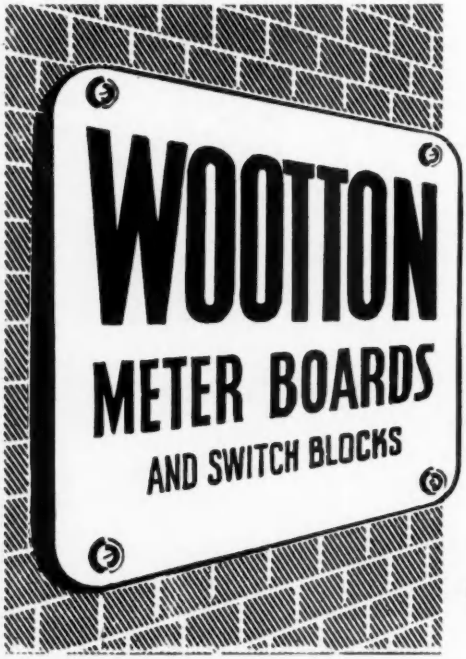

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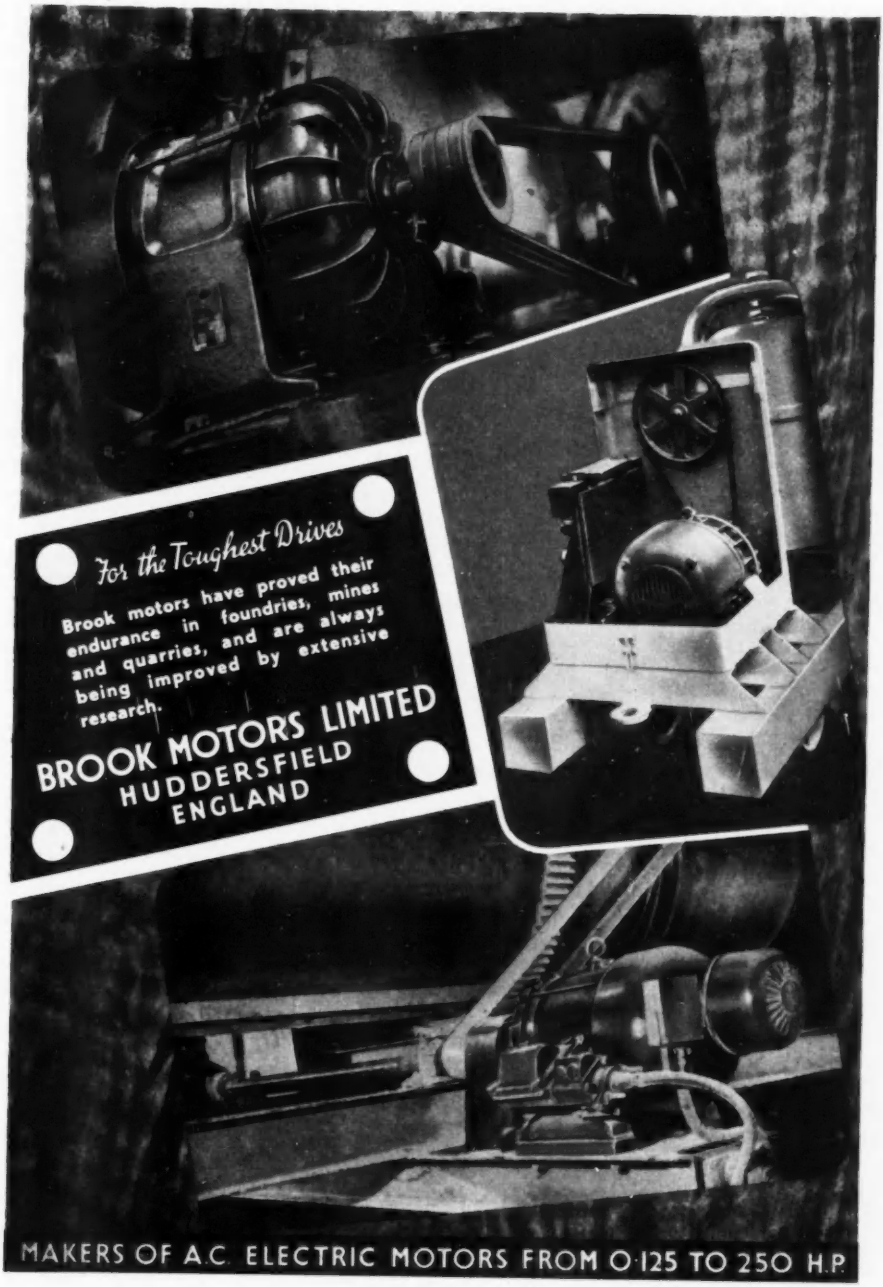
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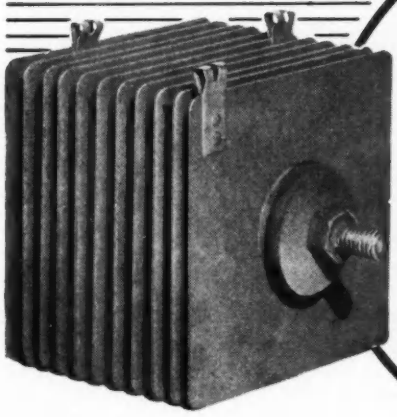

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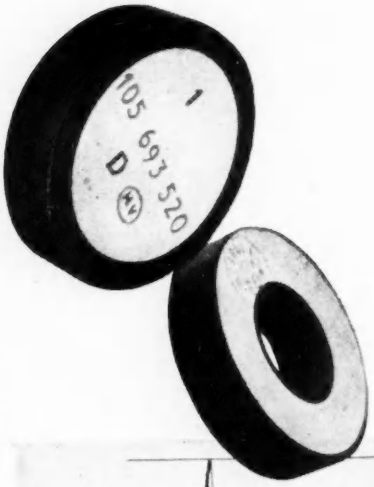
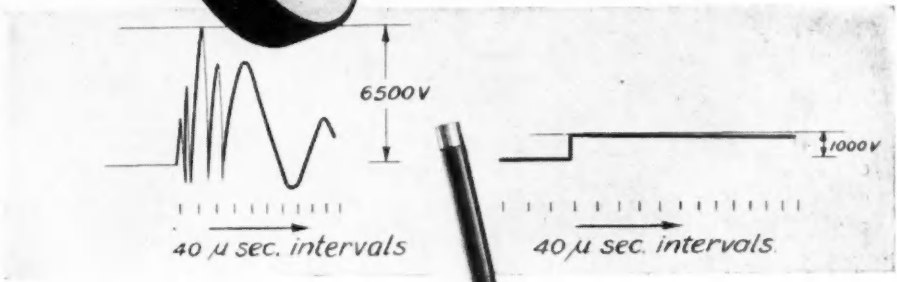
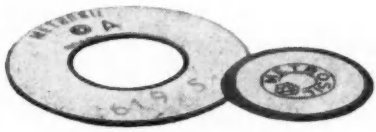


METROSIL

means protection against surge voltages





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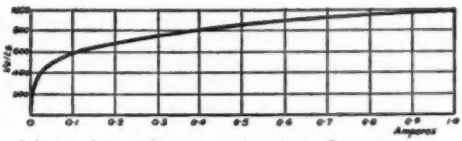

Relation between current and voltage for a typical "Metrosil" disc, examples of which are illustrated at the top of this page.

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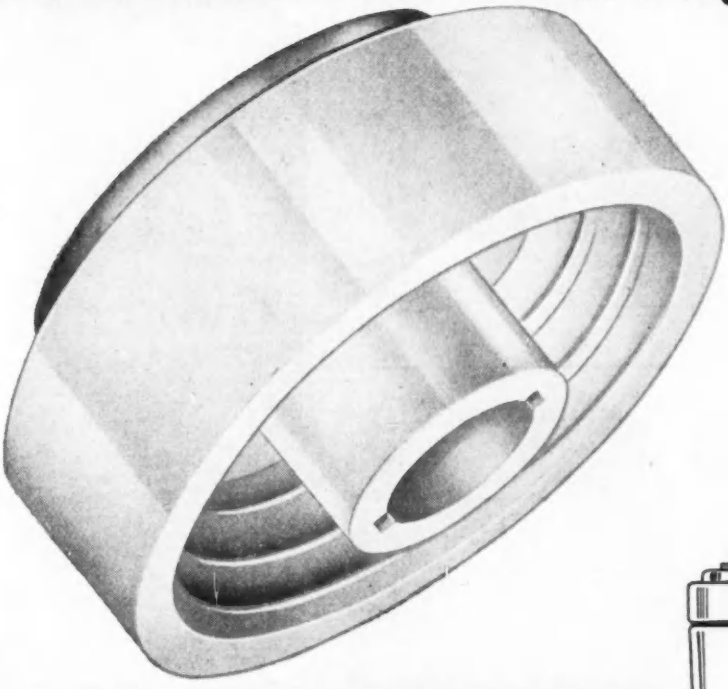

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ELECTRICAL TIMES

Vol. 122 No. 3169 THURSDAY, 31 JULY, 1952

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

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SUBSCRIPTION RATES.—United Kingdom and Overseas £2 10s. 0d. per annum. Canada C$7·50c., U.S.A. $7·50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 9d. each

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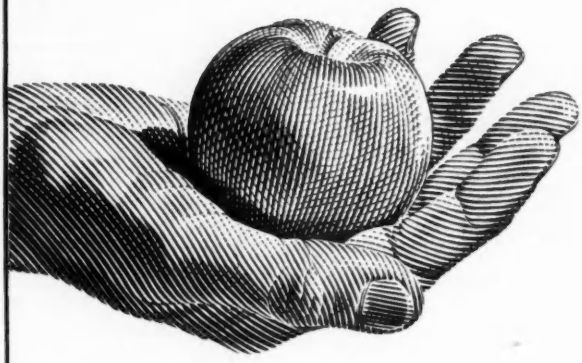

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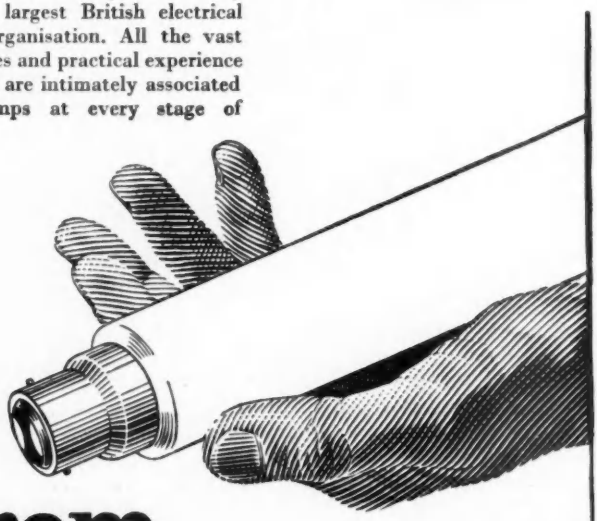

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Editorial

W.E. CABLE RATINGS AGAIN?

ARE we shortly to be faced with a return to the War Emergency Relaxations on cable ratings for installation work? There seems to be every possibility of some move in this direction, since the Ministry of Works are to approach the Institution with this recommendation. It is commonly understood that the Wiring Committee are giving consideration to the possible up-rating of cables and many feel that the next edition of the Regulations may give some easement in this direction. But the Ministry cannot wait for this. They urge that the War Emergency Relaxations should be re-introduced immediately as an interim measure, for this would provide an economy of some 20% in copper. Such a step, however, would probably mean two changes in ratings of some cables within a short time, with the consequent delay in the percolation of such alterations throughout the wiring industry. It is to be hoped that the studies undertaken by the Committee have reached a stage which will permit the publication of their final recommendations within a short time so as to avoid the clumsy device of interim ratings. Little difficulty would appear to arise in the case of the larger cables; it is the smaller sizes that set the problem, particularly in view of their widespread use and the greater care that has to be taken in respect of voltage drop when using up-rated cables.

PARALLEL RUNNING

IN recent months, considerable discussion has been taking place on the so-called reluctance of area boards to co-operate with factories, in the running of private generating plant in parallel with the Grid. Attractive though such schemes may appear at first sight, there is, however, a multiplicity of economic, technical and administrative problems which must be solved before such schemes can go forward. On the economic side, both the area board and the factory must assess the value to themselves of each scheme. This involves the estimation of such uncertain factors as the worth of stand-by supply, and apportioning of capital costs per unit exported and imported. Technically, provision must also be made for additional switchgear and protection adequate to the duty imposed by connection to public supply and, administratively, there is the problem of divided control of the plant between board and factory. While, therefore, official policy is on the side of these schemes, there is often an understandable lack of enthusiasm on the part of technical staff involved in their negotiation and preparation.

DOLLAR SOLVENCY

THE wide publicity given to the recent U.S. order for transformers has become almost dangerous since it appears to be leading to some loss of perspective of the trading possibilities between the two countries. While every credit is due to Ferranti's for their aggressive trading spirit, viewed against the total dollar gap, it is but a stone in the commercial void between the two countries. Undoubtedly, if the many varied restrictions on U.S. imports were removed British exporters would have a better chance of equalising trade between the two countries, as the President of the Board of Trade urged when addressing the American Chamber of Commerce last week. But would this be the whole answer to restoring trade balance? Can Britain ever supply the U.S. with sufficient manufactured goods to wipe out the dollar gap? Two other eminent speakers last week made it clear that this was not the way to solvency, though the reasons they advanced were somewhat different. The Rt. Hon. L. S. Amery stressed that the whole technical and commercial potential of America was too great to be assailed in this way,

while less charitably, perhaps, Mr. Leslie Gamage suggested that the vocal powers of U.S. manufacturers would be too loud to permit the volume of imports ever to equal exports. Both speakers, however, agreed that the way to dollar solvency was the indirect one, through the development of the Commonwealth, and it is to that end our policy should be directed.

CANADIAN APPLIANCE MARKET

WITH about 3,600 units sold per head of population it is natural to picture Canada as a country with a high standard of domestic electrification. While in respect of certain appliances this is certainly the case, a recent census summarised on a later page, shows that there is ample room for further domestic electrification. Perhaps the most surprising feature of the census lies in the low usage of vacuum cleaners. Only 42% of homes have cleaners, a figure slightly lower than that for motor cars. The extraordinarily low figure for electric cookers was to be expected, yet on the other hand, more homes have washing machines than hot and cold water supplies. It is clear that there exists in Canada a substantial market for electrical appliances, yet that country is normally considered as one inappropriate for the export of consumer goods from this country, in view of the different styling and technical requirements. These alone place a substantial capital burden on any manufacturer attempting to enter this market but with a high priority for exports and a recession in home trade to face, the possibility of exploiting such a market by either individual or corporate effort may be worthy of consideration.

C.B. TESTING LAGS DUTY

THIS country has been fortunate in the facilities that are available for short-circuit testing of circuit-breakers. Some other countries, notably France and the U.S., have made use of their large high voltage networks for this purpose, which although providing a simple and relatively inexpensive method has certain limitations, particularly in respect of availability and of the ever increasing size of units. No doubt it was such factors that led the G.E.C. of America to build their new switchgear testing station which is claimed to be the largest of its kind in the world. For voltages up to 380 kV it has a maximum output of 3,200 MVA symmetrical for the first quarter cycle. However, so rapidly is the rating of circuit-breakers increasing that even this capacity cannot achieve the operating engineer's desire of seeing the whole breaker tested as a single unit. With the prospect of a possible upper limit of 10,000 MVA for circuit-breakers on the 275 kV Grid, it is clear that there is little chance of ever dispensing with the testing of unit breaks.

WHERE DO TRAMS GO?

IN an age of wear and tear on machinery, equally with nerves, the tramcar has suffered a serious handicap by its long useful life and some surviving antediluvian models are still to be found crashing their way through provincial streets in this country and abroad. But in London the holocaust has been complete. No doubt by now many of the cars that carried delighted children and weary workers through the cobbled streets of the metropolis have found their way to the melting pots of a nationalised steel industry. But should any remain, may we put in a plea for an idea that comes from Copenhagen? There, for some years, an obsolescent locomotive and fire engine have formed part of a children's playground. So popular have they been, that they are now worn out with the passing of so many little feet and an obsolete tramcar is to be accorded this place of honour instead. Could not the powers that be allow one or two of London's trams to end their days in giving such pleasure to children. Certainly the perennial sale of conductor sets from toy shops gives a market survey of the popularity of the idea and in a country of uncertain weather the provision of a dry place in which to play would put to rest the minds of many anxious mothers.

Meteor

Electric Heating of Containers

Methods of using Power Frequency Current for Induction and Conduction

By C. A. M. THORNTON

ALTHOUGH numerous methods of heating material contained in vessels and pipes are known, such as immersion heaters, magnesia insulated metal sheathed elements, conduction of current through the material, maintaining an arc between electrodes and the material, infra-red lamps, dielectric and high-frequency induction heating, one method has advanced enormously in popularity in industry during the last 20 years, namely induction or conduction of power frequency current in the containers themselves.

Can the use of this method not be considerably extended and the competitive position of electrical heating not be improved thereby even though our power suppliers may not at present be looking for load?

Present Practice

Consider the way in which electrical heating is so often performed at present. We purchase alloy wire or strip of high electrical resistivity and resistant to oxidation at a high temperature, and heat this element by conduction of current. The heat so produced then has to be transferred by radiation, convection or conduction to the material requiring heat. For efficient transfer by radiation, a high temperature is desirable together with suitable reflecting arrangements. Precautions are desirable to prevent the accidental ignition of inflammable material which might touch the element. The life of such elements is limited and reflecting surfaces must be maintained or efficiency will fall seriously.

For efficient transfer by conduction insulating material must be found which is a good electrical insulator and a good thermal conductor—not an easy combination of properties.

Where, as in cooking, the material to be heated has to be cleaned from the heating surface the immersion type of heater is generally unattractive. Heat produced in this way can only be controlled coarsely without additional loss by a three-heat switch or similar arrangement. For these and other reasons our friends in the gas and oil industries have been able to compete with electrical engineers for a long time because they can offer quick and infinitely variable sources of heat with no fine wires or insulation to maintain.

It is, therefore, quite clear that a major improvement in electrical heating methods is desirable and this improvement should give the customer as much as possible that the other industries can offer, namely,

(1) A quick and economically variable source of heat. (2) No fine wires or insulation in transportable apparatus and as little as possible anywhere, as well as something no other industry can offer, namely, generation of heat all over the vessel itself.

Presumably the most rapid and efficient method of all is to heat the material directly by passage of power supply frequency current through it or by dielectric heating, but both of these methods are limited in their application.

Industrial Induction Heating

During the last 20 years steadily increasing use has been made in industry of induction heating of ferromagnetic vessels at power frequency. To speak of induction heating generally conjures up in the mind high-frequency induction heating, requiring expensive frequency conversion plant. It is not always realised that heat can be generated in a ferromagnetic vessel itself by induction at power frequency without any conversion or

Fig. 1.—Inductive heating of a vessel

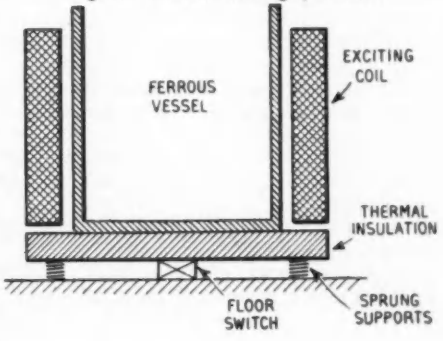
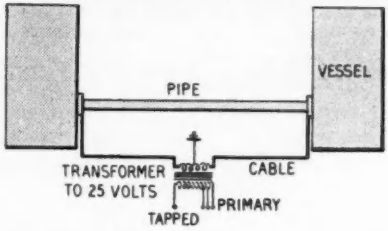


Fig. 2.—Resistance heating for short runs



transforming plant, with nothing in fact but a simple inexpensive and robust exciting coil, as shown in Fig. 1. The vessel acts both as magnetic circuit and single-turn secondary, and both flux and current are confined to a thin skin on the surface of the vessel. No current passes through the contents of the vessel.

Description of Induction Heating

The advantages of this method are:

1. Very high efficiency.

2. The source of heat can be easily varied economically and can be as great in amount as supply conditions permit. Heat is generated in the whole of the vessel itself, not only at the bottom. Dirt on the outside of the vessel is no disadvantage. Heat does not have to be conducted into the vessel.

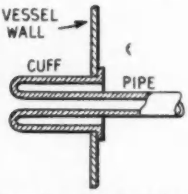


Fig. 3.—Cuff method for heating to pipe end

3. The exciting coil has not generally got such fine wires as a full voltage resistance element and it can be mounted off the vessel requiring heat. Its insulation can be of the strongest because it does not have also to be a thermal conductor. The vessel can be lagged and there is no danger of it becoming "alive." The disadvantages of this method are:

1. The upper limit beyond which the vessel cannot be heated in this way is the temperature at which the ferromagnetic material ceases to be magnetic, called the Curie point, about 750° C for mild steel.

2. An exciting coil with the vessel removed from it forms a potential semi short-circuit on the system.

3. Power factor (uncorrected) is unlikely to be higher than 60%.

4. Ferromagnetic material may possibly not be the ideal material of construction for the vessel.

It would appear to be well worth while to go through the whole industrial and domestic heating field with no other object in mind but a search for opportunities of using electrical inductive heating at power supply frequency.

Conductive Heating

Another method of which increasing use has been made in industry during the last 20 years is conductive heating at power frequency applied particularly to pipes of ferromagnetic material. (Fig. 2.) In this case a transformer is required so that no part of the pipe will be at more than low voltage from earth potential. It is true that pipes of non-ferrous material may also be heated in this way, but the generally higher resistance of ferrous material coupled with the "skin effect" obtained when ferromagnetic material is used, which multiplies the effective resistance by over four times, makes ferromagnetic pipes much more convenient to heat by conduction at power supply frequency than non-ferrous ones.

Although conductive heating is less likely to find application in the domestic field than inductive heating it might well be included in the search both in the domestic and industrial fields.

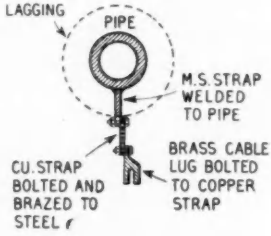


Fig. 4.—Method of connection

Installation Design

In the early days of industrial inductive and conductive heating at power frequency it was thought that it would be impossible to estimate the requirements of an installation. Consequently every project was made the subject of tests and the information required was found by trial. This was an extremely laborious procedure and probably did more than anything else to discourage those who contemplated using either method. In recent years, however, it has been found that the relationship between the current flowing in the surface of a ferromagnetic vessel at any point and the watts dissipated in the same surface at the same point obeys very closely a simple empirical law reminiscent of Steinmetz' law for hysteretic loss. This loss is proportional to $B^{1.6}$ where B is the maximum induction in each cycle

In the case of conductive heating the index is not exactly 1·6, the nearest figure to cover the whole range being 1·57, and the equation then becomes $p = C i^{1.57}$

Where p is the power dissipated in watts per unit area and i is the current per unit length of the surface in amperes, C being a constant which varies with frequency, temperature, resistivity, temperature coefficient of resistivity, permeability and temperature coefficient of permeability. For mild steel at 50 cycles and at 32° C, the value of C is ·000946 in inch units.

This law, alone, enables conductive heating installations to be calculated. To calculate inductive heating installations it is necessary to assume that, in a "round" vessel, i.e. a "solid of revolution," the current density is uniform over the entire external surface of the vessel. We know that this is not strictly true, but nevertheless it has been found to be the only assumption which gives correct estimates.

Lest any reader should be tempted to devise a more fundamental and scientific method than this to calculate inductive and conductive heating installations, it must be mentioned that this attempt has been made at least once already, with quite abortive results. The scientific method gave results which were entirely wrong while the empirical method gave results correct within commercial limitations of accuracy.

Conductive heating must be done at low voltage which involves transformation in any case. It is therefore generally convenient to control the heat economically by tap changing on the transformer primary winding. The tapping range provided for control of the pipe when hot may not be sufficient to keep the load on the transformer within its rating when the pipe is cold. This point must not be overlooked.

The exciting coils required for inductive heating are generally wound for medium voltage supply and the heat may be controlled by tapping the exciting coil and changing the tappings as required. The rule to apply to control of heat in this way is "the higher the fewer," in other words "the fewer the turns the higher the heat." The heat input is generally only limited by supply limitations, not by the size of the vessel.

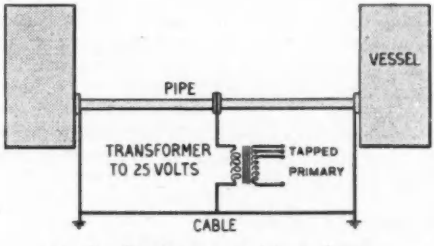


Fig. 5.—Single phase resistance heating for a long run

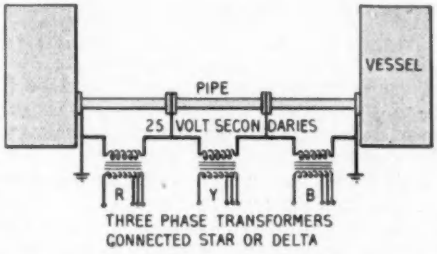


Fig. 6.—Method of using three-phase heating

Precautions with Induction Heating

With induction heating care has to be taken not to induce currents where they are not wanted, and therefore to keep ferromagnetic materials other than the vessel itself well away from the exciting coil, and, if proximity cannot be avoided, then to ensure that circuits of possible unwanted currents are prevented by providing electrical discontinuities in the ferromagnetic material. In one case in which this was done a workman who was ignorant of the object of the discontinuity thought he was doing the right thing by bridging the discontinuity with a steel plate!

Some hot vessels require lagging. This presents no additional difficulty with induction heating because the heat is generated in the vessel itself and the exciting coil may be wound on the outside of the lagging, or made self-supporting and fixed, so that the lagged vessel may be entered into the coil.

If for any reason it is impracticable to place the exciting coil outside the object to be heated it may be possible to place it inside. Provided the conductors of the coil are close to the metal to be heated satisfactory results may be achieved. Power factor is likely to be about half that obtained with an external coil before correction.

The wall of the ferromagnetic vessel to be induction heated should be thicker than the conducting "skin" on a thick-walled vessel which is likely to be between ·020 in. and ·035 in. thick, otherwise power factor will be reduced.

Three-phase Induction Heating

Various investigators have published drawings of three-phase induction heating of one container with three separate coils spaced apart from one another. This method may work to some extent but it is difficult to see how it can be as efficient as one coil to one container, fed single phase, because the currents in adjacent coils must to some extent oppose one another. No doubt it would be satisfactory where a long pipe requires for some reason inductive instead of conductive heating. Otherwise pending further investigations it is not recommended. It must be emphasised that the simple rules given above do not apply to the inductive heating of pipes. This is a separate subject not yet fully investigated.

Conductive Heating Precautions

If a pipe terminates in a flange bolted to a vessel, when heated by conduction the flanged end will remain much colder than the rest of the pipe. If the pipe requires to be kept hot to the end, because its contents would otherwise freeze for some other reason, this is best done

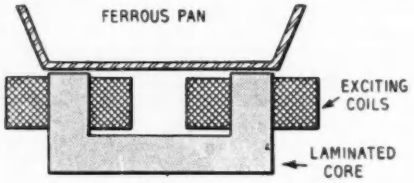


Fig. 7.—A simple pan-heating system

by forming a "cuff" at the end of the pipe. This is done by passing a short length of pipe of greater diameter over the original pipe and welding the two ends together as in Fig. 3. Difficulties may be experienced in making a cable connection to a hot lagged pipe. It is necessary to strike a nice balance between good current conduction and poor thermal conduction from the pipe. First the cable must have a brass socket brazed to the end of the cable core. It may sometimes be good enough to interpose between the cable socket and the pipe flange only a copper strip. Better cooling of the lug would, however, be obtained by interposing both a steel and a copper strip connected in series with one another. (Fig. 4.)

If a pipe is too long to feed in the simple way shown in Fig. 2 without requiring an excessive voltage it may either be centrally fed with return conductors from each earthed end (Fig. 5), or it may be divided into a multiple of three equal parts and fed as an open delta or deltas earthed at each end (Fig. 6). Return cables should be kept as close as possible to the pipe which may be heavily lagged if required.

Electric Welding of Pipes

An application of induction heating at supply frequency which is rapidly growing in popularity is to preheating large steel pipes before welding circumferentially and stress relieving the welds after welding. The requirements are a temperature of 400° C before welding and for stress relieving a temperature of 600/650° C maintained for a time which varies according to the thickness of the pipe, followed by cooling at a slow steady rate. Induction heating is ideal for control of the rate of cooling. The heat input required to ensure a constant rate of cooling tapers steadily as cooling proceeds. Good enough control could not be obtained by tapping the coil, which generally consists of 12 to 24 turns of cable. A voltage regulator giving infinitely variable control is therefore used. This application is an alternative to the use of gas fired muffles which are much cheaper in first cost but must be difficult to control with anything like the same precision as induction heating permits.

One advantage of the method is that one voltage regulator with switch and metering equipment will serve a variety of pipe diameters and thicknesses, the cable being adaptable to pipes of different size. If the end of the pipe is covered and a small window provided a perfectly uniform band of red-hot metal, about 3 in. wide at the welded seam, can be seen through the end window when the pipe is at 650° C.

For further details of this technique see the ELECTRICAL TIMES, Vol. 118, No. 3074, p. 538, dated October 5, 1950.

Domestic Applications

It is worth considering some well-known examples from the domestic field.

An iron made and used rather like the 19th-century article but with a detachable handle is an ideal object for induction heating. A series of tappings on the exciting coil could give suitable heats for various materials to be ironed or a thermostat switch could be employed. As the "iron" itself would be cheap two could be employed, one "iron" being heated while the other is in use. There would be no live material or electrical insulation in the iron itself and no flex to drag around.

Electric Cookers

Cylindrical containers for food made of "enamelled iron" could be rapidly heated by

induction in a recess lined with the necessary exciting coil. Containers designed for induction heating would tend to be of less diameter and greater height than those designed for heating from the bottom. A "floor interlock" switch might be used to prevent switching on the coil until a vessel is inserted. Variation of heat would be given by a tapping switch varying the number of turns of the coil in use. The cooker oven might also be heated by induction. Having no exposed elements it would be easy to clean and to control the temperature.

Flat spiral or "pancake" coils are not recommended for heating flat pans because the power factor is very low. The best arrangement would probably be a laminated horseshoe embraced by two exciting coils, the flat pan completing the magnetic circuit. (Fig. 7.)

The tank type offers an opportunity for induction heating while the "straight through" type might be a field for conductive heating. These would probably only compete with electrode boilers in small sizes. If the entire electric power service to a house, say of 60 amp rating, could be applied to this, 20 gallons could be heated for a bath in 15 minutes.

A more theoretical treatment of this subject by the author appears in the Proceedings of the I.E.E., Part II, April 1952.

CABLES TO BE UPRATED?

Official Recommendations for Economy in Wiring

AN approach to the I.E.E. with the request that the 1942 war-emergency uprating of cables shall be reintroduced is recommended in a new report, "Economy of Building Materials," which has been issued by the Ministry of Works. It is suggested that the 1942 I.E.E. recommendations should be promulgated immediately as an interim measure. In support of this view, it is suggested that a 20% saving in copper would result.

The 1942 recommendations, it may be recalled, increased the rating of 3/·029 v.r.i. from 5 to 10 amperes, 3/·036 from 10 to 15, and 7/·029 from 15 to 20 amperes.

Introducing the report at a Press conference, the Parliamentary Secretary to the Ministry of Works, Mr. Hugh Molsen, said that it was based on a detailed examination of the problems of material economy in the whole field covered by the Government works programme. It would be adopted as a guide to future building works by the service departments and the Ministry, but beyond this, many of its recommendations could be applied throughout the country in a wide range of building activity.

Electrical Installations

Besides the recommendations made for uprating cables, it is suggested that in future no allowance shall be made in the design of internal electrical installations for completely unknown future loads. In dealing with installation standards generally, the report considers that v.r.i. cables in heavy gauge screwed conduit form the most economical system of wiring in permanent buildings, having regard to life and facility of maintenance. However, in view of the shortage of conduit, it should only be used where technically necessary, t.r.s. or p.v.c. sheathed cable being generally preferred for domestic installations. Consideration should be given to the possibilities of grid suspension and similar systems.

For external services, armoured cable should only be used for operational (i.e., services) requirements. An increasing use should be made of aluminium sheathed cables, and cast iron used instead of steel for feeder pillars, with pre-cast concrete housings as alternatives. Aircraft lighting systems should be supplied by t.r.s. laid direct in the ground.

In general the various recommendations for lower standards will make impossible adherence to the post-war series of Codes of Practice, and this is explicitly recognised in the report. While it is realised that alternative materials and substitutes should be and are being used, it is strongly recommended that no compulsion for complete substitution of any particular material should be attempted.

It is emphasised in the report that little saving is possible by means of lowering the standards of maintenance. It is, however, possible to secure some economy in the use of materials for maintenance by improving the standard of technical control and supervision. As regards new construction, economy in maintenance may in the long run be secured by safeguarding and improving the standard of professional and executive staffs.

Copies of the report are obtainable from H.M. Stationery Office, price 2s.

Power and the St. Lawrence

VITAL IMPORTANCE TO CANADA OF THE SEAWAY PROJECT

THE importance to Canadian economy of the St. Lawrence project was emphasised by Mr. Robert N. Saunders, C.B.E., Q.C., chairman of the Hydro-Electric Power Commission of Ontario in a speech made recently at a luncheon sponsored by B.E.A.M.A. and the British Engineers' Association.

He began by referring to a comment by Mr. Buist, of B.E.A.M.A., that some British firms were having difficulty in preparing tenders within the time limit set by the Ontario H.-E. Commission. If the last day for tendering were too early for British manufacturers, they should send a cable to let the Commission know. There was no reason why the Atlantic Ocean should interfere in tendering on schedule unless the time factor in Canada was absolutely vital. The Commission desired to spend more in Great Britain.

The Scheme

On the question of the St. Lawrence scheme, Mr. Saunders pointed out that many years ago it was decided in the interests of Canada and the United States to have a 27 ft channel from the Atlantic to the Great Lakes. The Canadian Government had spent approximately $300 million in the construction of the Welland Canal between Lake Ontario and Lake Erie and on certain other minor projects; the United States had spent about $95 million in connection with the Great Lakes and the Seaway. The real point at issue was the link between Montreal and the St. Lawrence itself. Canada and the U.S. had, in 1941, entered into an agreement under which both power and navigation development was to be a joint venture, both countries being given credit for the money already spent. This agreement has not been ratified by the U.S. and Canada was therefore going ahead with the Seaway alone. The power development, however, fell under the jurisdiction of the International Joint Commission, which had twice in the past endorsed the seaway and power project. Meetings of this body were to be held at Rochester and Toronto, Odgensburg and Cornwall in the immediate future to get preliminary work started. If the Commission approved the power project, there was a chance of starting construction during the coming winter or early next year.

Some comment had been made on the necessity for this large project, but when it was considered that at Sault Sainte Marie the present tonnage passing through the existing system was greater than the combined tonnage of the Suez, Panama, Kiel and Manchester canals, the importance could be appreciated.

On the power scheme, Mr. Saunders pointed out that when he came to Hydro in 1948, demand totalled 2·7 million h.p. The present demand was about 4·2 million h.p. Ontario would gain about 1·1 million h.p. from the St. Lawrence.

The Ontario people were the greatest users of electricity in the world, having an average domestic consumption of 330 units/month or 3,960 units/annum. The domestic consumption in the U.S. was about 1,840 units per year. Last year, the *per capita* consumption in the U.S. was 2,414, whereas in Ontario it was 4,400. Norway held a higher *per capita* figure of 5,300 units per year, but most of that was exported in the form of finished products. As far as consumption was concerned Ontario had the greatest use per head.

Finance

Doubts had also been cast on the ability of Canada to finance the scheme. Canada had already spent $300 million on the canals—representing over $1,000 million at present-day prices. The St. Lawrence scheme would cost about $300 million to build the Seaway, and about $450 million on the power development, of which Ontario Hydro would have to pay half or about $225 million. The second tunnel authorised at Niagara alone would cost $314 million. The total of the post-war programme worked out at $1,200 million of which $725 million had already been spent. Since the war Hydro had borrowed $720 million, and of that $620 million had been borrowed from the city of Toronto, and in no other place. Compared with these figures $225 million did not seem to be enough money to cause worry.

It was probably within the power of Ontario Hydro to build the scheme without outside labour, but they would stick to the policy of inviting tenders.

Our readers' views ...

Static On Cars

WITH reference to the letter "Static on Cars" from Mr. E. Bartlett (Our Readers' Views, the ELECTRICAL TIMES issue of July 17), may I suggest that a static charge might have been generated due to the chafing action between the upholstery of the seat he was occupying in the car or taxi and the covering of his nether regions, thus the reason for your correspondent receiving the shocks.

Phenomena of this kind have been experienced on a number of occasions. The fitting of loose covers to the seats has eliminated the trouble.

One particular case of "static" caused minute sparks to be set up between the junction of the petrol pipe and float chamber nut when the electrically operated petrol pump was working. It would appear that static was generated by the flow of petrol through the flexible rubber-cum-metallic tubing. Although these sparks appeared alarming in close proximity to petrol, they were found to be intrinsically safe.

Compressed air used under certain conditions has been known to set up static charges of sufficient energy content to ignite an explosive mixture of air and methane.

It would be very interesting to hear more about "static" from an authority on such matters.

E. A. Robbins

WORKSOP

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Electricity in the Home

THE controversy over the best and proper method to be used for domestic heating and cooking appears to be getting out of hand. Conscientious householders do not know where they stand.

If they lay out capital on electrical appliances suitable for their needs they are continually bombarded with requests, bordering on demands, to restrict the use of these during peak hours. These "closed periods" cover a very fair proportion of the day when the appliances are the most necessary for their comfort and well-being. If, on the other hand, householders invest in other means of heating and cooking the Authorities complain that the rate of load growth is not being maintained and that the load factor of the system is deteriorating.

Should then they spend, what is to them, big money on appliances they cannot conscientiously use at will or should they purchase non-electrical equipment they can use but at the expense of the desired growth of the electrical supply industry?

H. W.

MANCHESTER

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Use of Explosives

WITH respect to setting poles in swampy ground by explosive charges, the *Electrical World*, issue of June 30, carries an article "Five ways of setting poles in swampy and sandy soils."

Actually six methods are described, i.e., manual, power digger, air jet, water jet, sewer tile and explosive.

Some of the conditions described are very severe; for example, setting poles in tide water with a low water depth of five feet.

Your correspondents who have been discussing this problem will find this article of interest.

J. P. Thornton

VICTORIA, CANADA

NEW EDITION OF GARCKE PUBLISHED

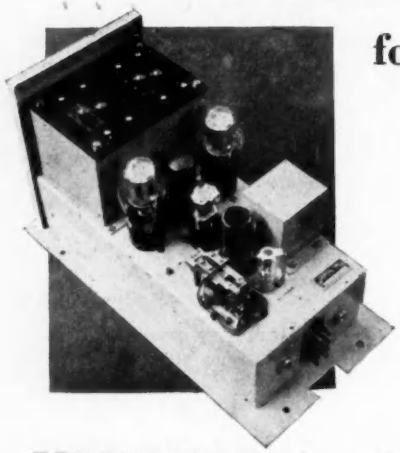
AFTER the complete change necessitated as the result of nationalisation of the supply industry, this familiar volume has settled down once again into its steady pattern, and the sections now come readily to hand. The only modifications this 49th edition carries are details of the standard tariffs of the area boards (although some are being altered), and the inclusion of a topographical index to the district offices, but all the material has been revised. There is, of course, the usual information relating to the B.E.A., the Divisions and Area Boards, together with data on other undertakings in Great Britain. The volume is completed with particulars of various manufacturing companies and a directory of personnel, making it again a welcome and valuable addition to the reference shelf. Published by Electrical Press. 900 pages, 6¾ by 5⅜ in., price £3 10s. The full title of the volume is "Garcke's Manual of Electricity Undertakings."

ELECTRONIC CONTROL UNITS

for A.C. Voltage Regulators

An analysis of electronic circuits for stabilising output voltages

By R. E. JENNINGS, A.M.I.E.E.*



VOLTAGE stabilisation of a.c. mains is becoming increasingly important with the extending application of voltage dependent equipment such as furnaces, photographic and colour processing, lamp life tests, laboratory apparatus and electronic equipment as in radar and television transmitting equipment.

The load range may be between 5 and 300 kVA single or 3-phase, and the accuracy of voltage required is usually $\pm 0{\cdot}5\%$. One piece of apparatus which is being used successfully to solve this problem is the variable ratio transformer type regulator used in conjunction with an electronic control unit. Fig. 1 shows the circuit diagram of the apparatus with a double-wound series transformer used for bucking and boosting the supply voltage which may vary by as much as $\pm 20\%$.

Voltage regulators of this type are highly efficient and reliable and it is therefore important that the "brains" of the equipment, the electronic control unit, should also be reliable, require the minimum of attention and maintain its accuracy.

Several designs of electronic control unit are now in use but the circuits described below have been designed with the minimum number of components and have given satisfactory performance.

Specification

In designing the control unit the following points are considered necessary: (1) any input voltage between 200 and 250 V shall be suitable; (2) it shall be suitable for use on all power frequencies with a possible variation from nominal frequency of $\pm 4\%$; (3) fine control of voltage level; (4) maximum voltage sensitivity to be $\pm 0{\cdot}5\%$, with adjustment to $\pm 2\%$; (5) the control must not cause overshoot or hunting of the regulator with a speed of correction of 2% per second; (6) constant r.m.s. voltage must be maintained at output terminals.

Details of circuit

Fig. 2 shows the circuit diagram of a control unit which satisfies the above specification. The bridge network R_1-R_2-R_3-V_1 (a) is supplied from a d.c. source through the neon stabiliser 85A1 and its balance is controlled by the impedance of one half of the double-triode V_1(a). The other half of the double triode V_1(b) is used as a half wave rectifier for an a.c. voltage derived from the mains transformer and produces a d.c. signal which is proportional to the mains and which is connected in opposition to the reference voltage across the neon stabiliser to the cathode and grid of V_1(a). The d.c. balance voltage is equally divided by resistors R_4 and R_5 and is applied in series with a common a.c. bias to a pair of thyratrons V_2 and V_3 (GT1C). A split field series motor of 1/20 h.p. is used to drive the regulating transformer and is supplied from an a.c. source via the two thyratrons.

The smoothing network connected to the triode V_1(b) gives a d.c. signal output which is approximately proportional to the r.m.s. value of the supply voltage when the harmonic content does not exceed 5%. This useful feature enables the apparatus to be installed in most supply systems without requiring adjustment for waveform changes.

With changes in mains voltage the grid voltage of V_1(a) varies and the bridge R_1-R_2-R_3-V_1(a) is unbalanced. Depending on the direction of the mains change the output of the bridge will inject either a positive voltage

* *Research Engineer of Foster Transformers Ltd.*

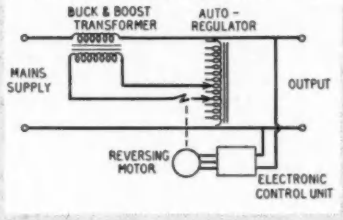
on the grid of V_2 and a negative voltage on the grid of V_3 or vice versa thus causing one or other of the thyratrons to conduct. The direction of rotation of the motor will of course be determined by the thyratron which is conducting.

Adjustment of the voltage level is made firstly by tapping selectors on transformer T_1 and secondly by fine control potentiometer R_6 while sensitivity adjustment can be made by introducing a d.c. potential into the grid circuit of the thyratrons at R_7.

An alternative circuit is shown in Fig. 3. Here the amplifying triode is replaced by the 85A1 thus forming with resistors R_1, R_2 and R_3 a voltage sensitive bridge, the output of which is applied to the grids of the thyratrons. Other differences in this circuit are (a) the use of tetrode thyratrons and (b) a modified biasing circuit using the inverted wave of a full wave rectifier circuit (Fig. 4).

This voltage dependent bridge is not so sensitive as that of Fig. 1 but the use of tetrodes and the above biasing method enables the circuit to be adjusted for a maximum sensitivity of $\pm 1\%$. The controlled voltage in this circuit, however, will be the mean value instead of the r.m.s. value.

Fig. 5 shows a modification of the last circuit to make it suitable for stabilising the r.m.s. value of the mains voltage. A saturated diode 29C1 is used in the place of the 85A1 and its filament is connected via a level adjusting



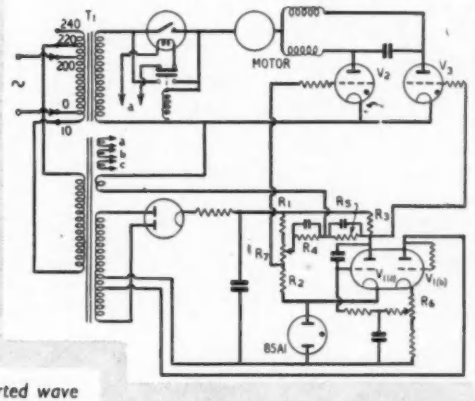
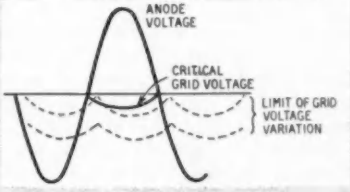
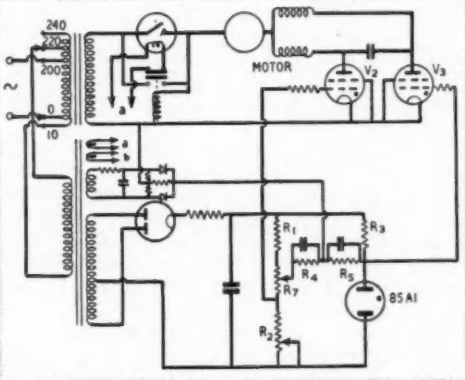
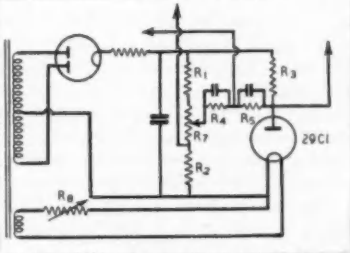


Fig. 1 (above).— Circuit showing buck and boost with control unit
Fig. 2 (right).—Circuit diagram of an electronic control unit
Fig. 3 (below).—An alternative circuit for Fig. 2
Fig. 4 (centre, right).—The use of inverted wave of a full-wave rectifier for biassing
Fig. 5 (bottom right).—Variation of biassing circuit used in Fig. 3







resistance R_8 to a winding on transformer T_2. The rate of change of anode voltage in the 29C1 is approximately 8 times the mains voltage change so that a greater output signal is obtained from the bridge than in the case of Fig. 2 and it is possible to obtain sensitivities of $\pm\frac{1}{2}\%$. This signal is used to control the thyratrons as shown in the earlier circuits.

Normally one expects the gas-filled valves to require replacement rather more frequently than vacuum valves but circuits of the above type have been in continuous use for over two years and it has not been found necessary to replace either GT1C or 85A1. A helpful feature of this application, of course, is the constancy of the heater voltage applied to the valves.

Dimensions and weight

The circuit of Fig. 2 is shown in the heading photograph in its finished form. The overall dimensions are $13\frac{1}{2}$ in. x 7 in. x $7\frac{1}{2}$ in. high and the weight 20 lb.

EMPIRE TRADE

A Call to Arms by Mr. Leslie Gamage

THE importance of a long-term trade policy with the Empire was particularly stressed by Mr. Leslie Gamage, President of the Institute of Export at an Institute luncheon held at Birmingham last week.

Since the end of the war, he said, we had jumped from one crisis to another. The crisis we faced today, if realised by the mass of the population, would lead spontaneously to harder work and maybe longer hours. All we had instead were demands for more wages which, if granted, would result in certain bankruptcy. Every crisis resulted in more demands for export. The Institute had tried to instil this 17 years ago. But the Institute had never stood for import restriction. This policy would lead to all sellers and no buyers.

Even now, the Government tried to force exports from factories primarily engaged in home market production, by threatening to cut off supplies of raw material. We had, however, to cope with keen competition from Germany and Japan, together with the United States who were exporting products as part of some 'Aid Plan' or other. For high quality we needed a vigorous home market.

Government bulk buying led to uncertainty of supply and encouraged individual firms to stockpile, thus aggravating an inflationary price system. The introduction of social security and a shorter working week was sheer folly in our economic circumstances after the war. We had spent millions on ill-considered gambles, disguised the true position from ourselves by food subsidies, and removed all incentive by taxation. With the price fluctuations of wool and rubber due to the Korean war we had been able to remain solvent.

The question of exports was of such importance that the Secretary for Overseas Trade should be of Cabinet rank. What, however, was a long-term solution? At the moment we were dithering between hoping the people of the U.S.A. would permit a volume of imports to match their exports and vaguely thinking of developing the Empire. In the first case the U.S.A. produced many articles which we needed, without herself being a natural market for our own products. We could only pay for American products by our own exports to America, and we could never obtain a balance. It might be possible in 20 years to export raw materials from the Empire to America but not at the moment. Within the Empire, however, we had vast potential resources both of raw material and food. We must go all out on the Empire plan, despite the fact that the Government only gives lukewarm support and the American Government supports more trade with U.S.A.

One thing was certain, the need for trained men in the export trade was greater than ever today, and would increase as the years went by. The Institute of Export also had to look to the future. For thirteen years, there had not been a competitive world. The young men recruited during those years were not accustomed to fighting for orders, nor to paying that punctilious attention to after sales service which was so vital. They had to be taught and educated for the fray.

Nothing had been more justified by events than the foundation of the Institute, though its work had never received at the hands of any Government the recognition it deserved. It nevertheless seemed as though the progress made by the Institute had slowed down somewhat in latter years. Had we lost our enthusiasm and the old crusading spirit? The Institute should be an insurance that the export trade of this great country would be in good and experienced hands in the future.

A Shorter History of ELECTRICITY

L. T. Snow from his deck-chair refreshes our memories on a few points

THE Greeks invented electricity. They did it by rubbing amber with cats' fur. This made the amber attract small particles, and the cats' fur to stand on end. It was only natural really, as the cats did not care much for being rubbed on amber.

The Greeks did not do anything else about electricity, as they were busy at the time with a war; and the next to do anything was an Italian called Galvani.

Galvani found a way to make frogs' legs twitch by electricity. Neurotic frogs could twitch alright without Galvani, but nevertheless the discovery was very important, and it led Volta to invent his cell.

Volta's cell was very useful and very popular, and he made a great deal of money out of it; hence the expression—Volta's Pile. Volta also invented volts, which are the things which push amps around the circuit. Actually amps were not invented until fifty years later, so the volts had to push around on their own for a bit. This gave rise to static electricity. Static electricity is very interesting, but not very useful. It is used mostly for lightning.

After Volta, the Electricity business became very brisk. Ampere invented amps, Ohms invented ohms, Watt invented watts, Milly invented mili-amps, and Meg invented meg-ohms. The latter showing the early influence of women on electricity. However, it has since been proved that all these were really invented by a Russian called Serge Arkover, but he did not mention it at the time as he was on nights.

The turn of the eighteenth century was now nigh. It turned after 1799 as predicted, and electricity went along at a great pace. Coulomb invented coulombs, Henry invented henries, Eddy invented eddy currents, Gauss invented geese, Evershed invented Vignoles, and Baden Powell invented Boy Scouts. At this stage electricity was getting along very nicely when clerk Maxwell put the whole thing on a mathematical basis and took half the pleasure out of it.

The greatest inventor of all was Faraday. Faraday was sickly as a youth, but he got better, and invented electro-magnetic induction. This enabled electricity to be made in large pieces, and without it we should not have all the benefits of modern civilisation such as wireless sets and atom bombs. Faraday was a prolific experimenter, and some of his experiments are classics. He conducted the Ice Pail Experiment, the Butterfly Net Experiment, the Faraday Cage Experiment; he also experimented with electricity.

After Faraday, the Electricity business got very big, and it was not long before people started selling it for money. This took the other half of the pleasure out of it, and gave rise to a vast hierarchy now under the control of administrators and policy makers. These are very important people, and are very busy making policies. They are naturally of much more account than the old fashioned types who only make the electricity.

Nowadays, there are two sorts of electricity —d.c. and a.c. D.C. is a bit old-fashioned and goes the same way all the time, but a.c. comes and goes. It goes mostly in the mornings about 8 o'clock just when you need it most.

The supply keeps getting better, but the demand gets better as well, so nothing happens. This is called a vicious circle.

Vicious circles are very dangerous and can turn into inflationary spirals if not carefully handled. This is called economics. Economics is a very difficult subject, and is different altogether from electricity.

Protection Against Corrosion

PROTECTING metal surfaces permanently from corrosion is generally regarded as expensive. Where expense is to be avoided, the use of a temporary protective can not only prevent corrosion for a limited period, but save time and labour in applying and removing the protecting surface. In "Corrosion and Temporary Protectives," published by Shell Petroleum Co., Ltd., considerable space is devoted to the uses of this type of protective coating.

Consideration of the causes of corrosion is concerned mainly with electro-chemical action. Special consideration is given to the prevention of corrosion in machinery. The protectives dealt with in the brochure consist of what are known as soft oily and hard coatings, derived from a petroleum base. Selection of the most suitable type and methods by which it is applied play an important part in their effectiveness.

Problems and Practice

IN ENGINEERING

Sleeve Bearings

EXAMINING a 30 h.p. hoist motor, I noticed a peculiar guard between the brake wheel and the motor bearing, and on querying its purpose was informed that it had been fitted to prevent oil being drawn from the motor bearing by the fan action of the large brake drum. Closer inquiry revealed that before the guard was employed, oil was thrown from the bearing in sufficient quantities to necessitate replenishment about twice per week. Even with the guard in position there was evidence of oil travelling along the motor shaft in small quantity, but without the guard the windage from the brake drum did appear to increase this wastage, and in fact oil was thrown on to the drum and surrounds.

At the next plant stoppage the c.i. white metal sleeve bearing was removed from the motor and examination showed very shallow oil grooves at each end with only one $\frac{1}{8}$ in. dia. hole in the bottom of the groove to return oil to the oil well. The groove sizes were increased, and two additional $\frac{1}{8}$-in. holes drilled on each side of the existing hole, making five holes at each end. It was evident that the single hole had not been sufficient to return all the oil to the well, consequently allowing it to travel along the shaft and out of the bearing housing, when the fan action of the brake drum had thrown it around.

The motor now runs without the improvised guard, which had simply been a palliative and no cure for the actual fault. As a further precaution against possible future oil migration, a leather washer, cut slightly less in diameter than the motor shaft, was fitted to the bearing cover plate, making an effective oil seal.—*T. H. Snelson.*

Replacement Coils

THE extent to which the quickness in repairing a faulty motor depends upon the spare parts immediately available has often been considered, and every maintenance engineer at one time or another has been unable to get a motor back into service as quickly as he was capable of doing because some delay has been experienced in obtaining a replacement part. While it is impracticable, even for the largest firms, to have complete spare motors standing ready for use in the event of trouble in motors of large horse power; and while it is often considered unnecessary by smaller firms to have spare motors for their smaller horse-power motors, it is a wise precaution to have in stock spare parts the procuring of which might cause delay when required for an urgent repair.

This note is to suggest that the above policy could well be extended more generally than is the case to the replacement coils required in a fault in a motor winding, particularly a.c. stator windings and d.c. armature windings.

A complete set of coils, together with slot insulation and wedges, can be obtained from the motor manufacturers by the quoting of the motor reference number, and at a fraction of the cost of the complete machine. Such a complete set of equipment can be stored conveniently in a dust-proof box, suitably labelled to indicate the contents and the particulars and position of the motor for which the re-wind material has been prepared. When a firm employs their own re-winding staff, or when a firm engages the services of one repair firm who are ready to co-operate in carrying out repairs as quickly as possible, the availability of coils already "formed" and impregnated, together with all slot insulation and wedges ready cut to the correct size is a welcome realisation. Often delay would have ensued by waiting for the correct size and type of conductors to be delivered from a supplier.—*R. A.*

Conduit Continuity

IN systems where conduit is used for earthing it is important that the conduit has a low resistance. This resistance is often increased at any screwed connections due to the threads being badly made and loose, or the threads being rusted due to dampness. To prevent this, get some fine lead filings, make these into a thick paste with petrol, just start the threads, then smother the remainder with this paste. Then tighten up the connections. The lead will be ground into the threads, making them both conducting and watertight.—*W. E. W.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered.

31 JULY, 1952

The clever use of panel mirrors makes the new showroom appear some four times its real size

Flexible Ceilings Aid Lighting Design

Courtney Pope use new idea in re-equipped showrooms

WELL KNOWN in both store fitting and illumination engineering circles as a firm which prefers to both look and think ahead in design as well as construction, Courtney Pope, Ltd., have incorporated a new idea in flexible ceiling construction in their re-designed showroom at their Tottenham works.

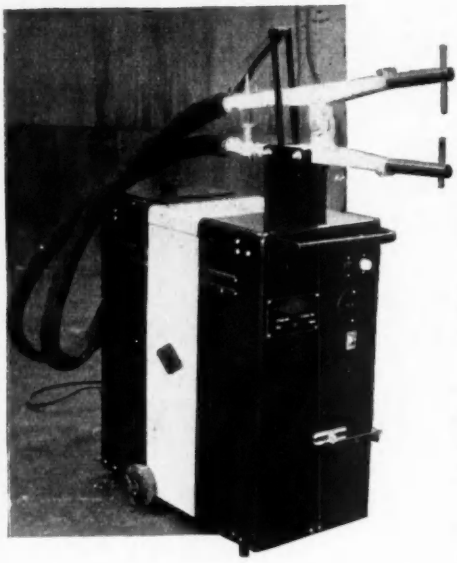
These ceilings, handled in this country by Frenger Ceilings, Ltd., 29 Woburn Place, London W.C.1, combine low-temperature radiant heating and acoustic properties with a flexible system of lighting which in modern showrooms is a prime essential.

Three-fold in use, the Frenger ceiling is first a radiant heating panel unit; secondly a sound-absorbing surface; and thirdly a flexible unit construction ceiling which is easily altered or removed for rearrangement of lighting and other services or repair and maintenance of heating, ventilating, water, Lamson-tube and sprinkler installations.

Millinery "on tap" at the Hat Bar

It consists of a square section grid piping system, through which hot water circulates, supporting perforated aluminium panels and blanketed by thermal and acoustic insulating sheets (in this case mineral wool fibre in Kraft paper quilts). The metal panels 2 ft square pressed from aluminium with integral contact-flanges are snapped into position quite easily and can be removed equally easily for maintenance of the services they conceal.

Because of its flexibility for lighting design, Courtney Pope have adopted this ceiling in their new showroom. As is seen from the accompanying illustrations, a large selection of fittings by Courtney Pope (Electrical) Ltd. have been installed in the showroom which by the contemporary style decoration and the clever use of plate glass mirror panels shows a section of a large modern store dealing with men's wear, lingerie, dresses and millinery. With the addition of garments and accessories provided by clients of the firm, the showroom certainly permits the shop-fitting equipment and lighting designs to be seen to their greatest advantage.



Mobile Spot Welding

Inexpensive plant for car repairs

THE introduction of welding technique into the building of car bodies has brought in its train many problems of repair. One of the main difficulties lies in the fact that after the bodies have been disassembled it is extremely hard to re-weld the bits together.

The firm of Thos. P. Headland of 166 Westminster Bridge Road, S.E.1, have in the past two years received many requests for assistance in this matter, and have devised a small inexpensive mobile spot-welding plant.

Capability of Plant

Two models have been designed: one for use on a 400-volt single-phase supply only, and a universal machine with a tapped transformer primary suitable for use on 200-250-volt single-phase or 380-440-volt single-phase.

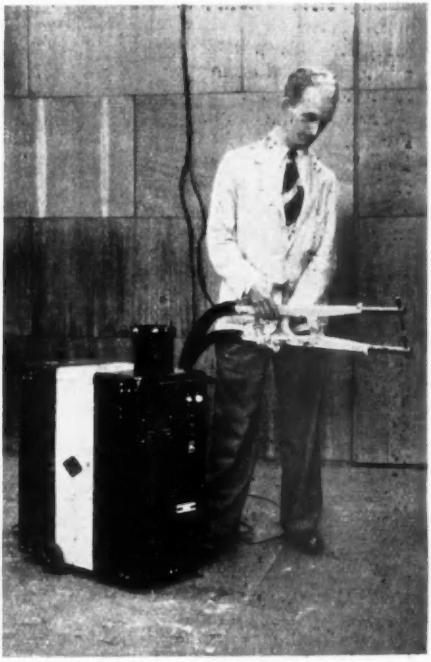
As welding type transformers have an inherently low power factor when operating, a static capacitor has been built into the equipment to bring the power factor up to 0·9. A built-in timer also provides fractional time control from 3 cycles—0·06 secs—up to 5 seconds. This timer operates on the resistance-condenser system and is a well-established and proved design.

Welding capacity covers thicknesses up to 2 × $\frac{1}{16}$ in. mild steel, or 18 gauge to $\frac{3}{16}$ in. mild steel, with a normal throat depth of 12 in. An anvil system can, however, be provided to permit of hand pressure spot welding where greater throat depths are required.

Using the standard head, the electrode pressure of 160 lb is provided manually through a lever system, the switching on of the equipment being performed automatically when the electrodes are in full contact with the work. As can be seen from the photograph, the head is connected to the transformer and auxiliary equipment, by two 5 ft secondary welding cables. Weight of the head itself is about 13 lb.

By mounting the welding head on clamps fitted to the top of the power unit, the whole assembly can be converted into a pedestal machine, and in this condition control of the welding current is exercised by the operation of a foot pedal. Thus the machine can also cope with small components or production runs.

Although in its present state the machine is a prototype, as it is built of standard components it can be built up quickly. At the moment the prices are £136 for the standard equipment and £146 for the universal model. Delivery is estimated at seven to ten days.



The welding head has maximum portability

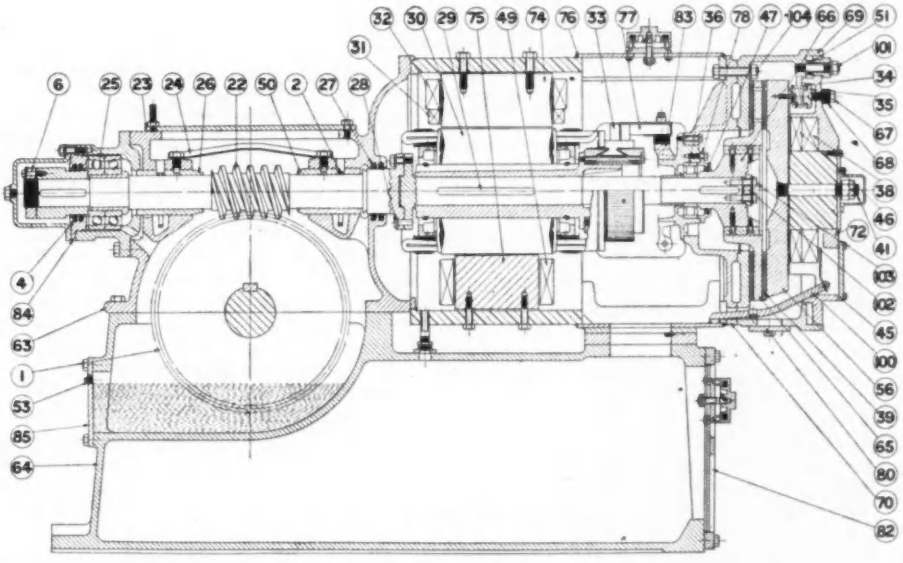
WINCH CONTROL

Application of Regenerative Braking Saves Wear and Speeds Operation

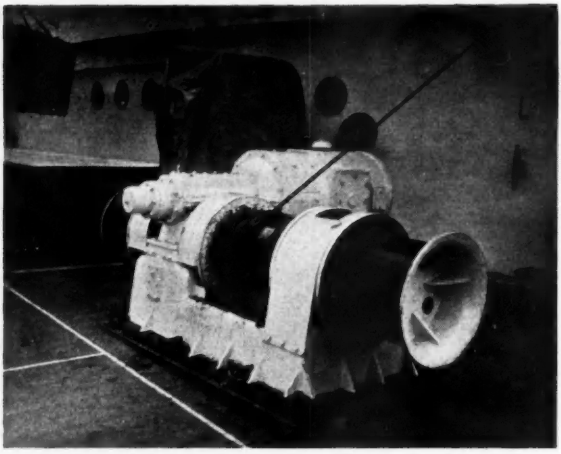
THE electrically operated ship's winch, and its associated contactor gear, has to operate under particularly arduous conditions. It must be weatherproof, foolproof, capable of withstanding gross maltreatment, and above all must require the minimum of maintenance. At the same time it must be easily and rapidly controlled and must also be precise and efficient in operation. The use of regenerative braking of d.c.-driven winches is not new, in fact Laurence Scott and Electromotors of Norwich brought one into production some six years ago, and now many hundreds are in operation. From this beginning, however, several developments have taken place, and the latest type—the Scott Dynamic "Selector" Winch—embodies new features leading to greater ease of control and automatic selection of the speed of hoist according to the load. A further refinement is that regenerative braking can be applied down to a remarkably slow speed, with a consequent use of the brake only for holding the load stationary or in the event of failure of power supply.

The winch itself consists of a robust 37·5 h.p. d.c. totally enclosed motor driving the barrel and whipping drums through a worm reduction gear. At the commutator end of the motor, the shaft is extended and carries a friction plate. A brake plate, spring loaded to give full braking force, is held away from the friction plate while the motor is running, by means of an electromagnet system.

Control of the winch is exercised by a drum type pedestal controller which may be placed where found convenient in the ship. All final switching is, however, carried out by a contactor board which can also be located at some distance from the winch—even below decks. Apart from the relays and contactors, themselves, this board also includes the traction type resistor banks which are switched into the



Section of winch showing the arrangement of the motor, gearing and the electro-magnetically operated brake system at the commutator end of the motor



Winch mounted on the deck, the control is being exercised by the operator in the temporary hut

circuit to dissipate regenerated energy if no other suitable load is on the d.c. system.

Operation

The drum controller is operated by a lever moving in a vertical plane, the drive being transmitted to the drum itself by a pair of bevels. Four speed steps are given in either direction, the low speeds being obtained by armature shunting. In the hoisting direction, with the controller on the fourth (high speed) step, the speed given at full load is about 130 ft per minute. If, however, the load is about two-thirds full load or less, the speed is automatically increased by a load discriminating contactor to about 200 ft per minute, and, should the load be half full load or less, a further step of load discrimination increases the hoisting speed to about 250 ft per minute. On light hook, still further load discrimination operates and the hoist speed rises to 450 ft per minute.

The reverse process operates on lowering, speeds being 450 ft per minute on light hook, 360 ft per minute between quarter and half load; and 250 ft per minute between half and full load. Lower speeds are of course obtained on the other steps and on step 1 the landing speed is reduced to about 25 ft per minute. As smooth and steady braking is obtained electrically at all speeds, no foot brake is fitted. On step 1, the slow landing speed is obtained by cutting all power off the armature and connecting it to the banks of dissipating resistors. Thus, when the load bottoms, the winch comes to rest automatically.

The arrangement of the contactor gear and resistances is in panel form and designed normally for deck-house mounting. Care has been taken in the design to permit ease of access for inspection and maintenance under all conditions, with the provision of adequate room for the resistances. As the contactors are of the unit type having standardised parts, the number of spares required is reduced to a minimum.

In a machine of this type, heavy current surges may be set up by quick switching on the early steps, and to prevent such currents reaching a magnitude sufficient to cause damage, electrical lock-outs are introduced. On the later steps, special design of the motor field circuits has introduced time constants which ensure that no damage can be caused.

The "Selector" winch is made for normal full loads of three to five tons and forms one of a wide range of winches of various types, suitable for ships of all classes and for a.c. and d.c. supplies.

Shock Testing

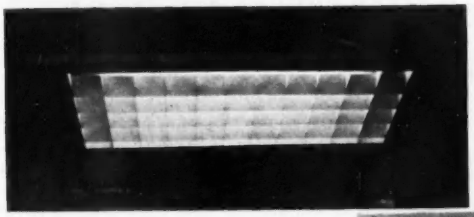
Following an examination of the winch last Thursday, when the equipment was put through its paces before a small but critical group of spectators, Laurence Scott and Electromotors took the opportunity of showing a series of films dealing with the effect of shock testing on contactor gear. In these, the contactor was mounted on a spring loaded plate, which was in turn subjected to violent impact from a 400-lb weight in all three planes. The camera, obtained specially for this purpose during the war, was the high-speed type, taking some 3,000 frames per second. The audience was astonished and fascinated to see the consequent slow motion film (projected at normal speed) and the remarkable displacement and distortion imposed on structures which would normally be regarded as rigid under these circumstances.

Other films showed the effect of critical vibration on such items as resistor bank assemblies and panels. Here again, at resonant speeds, displacements of well-nigh incredible amplitude were recorded.

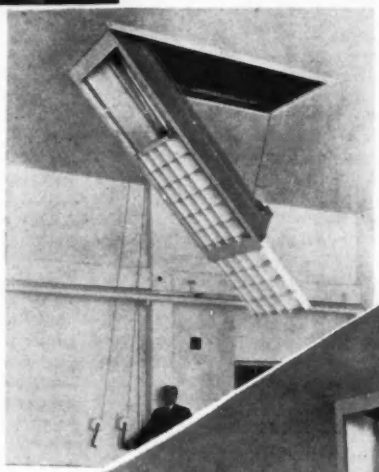
This work has resulted in considerable modification and alteration to contactor design, both electrically and mechanically.

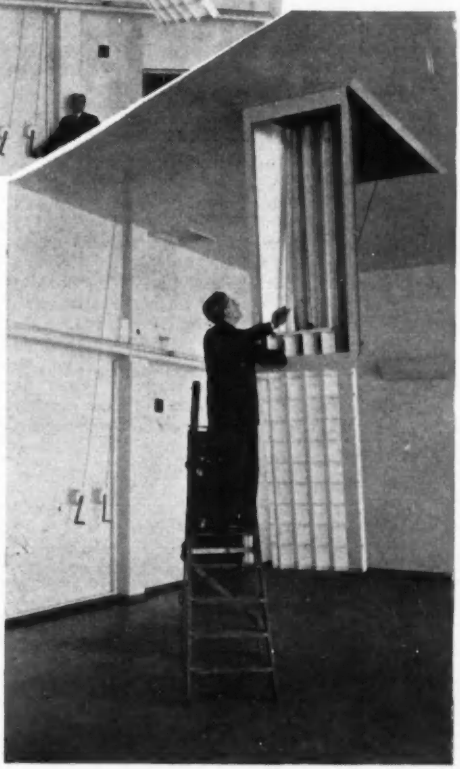
Lamp Service FROM FLOOR LEVEL

New Ediswan Laylight Obviates Climbing



At first sight the new laylight appears quite orthodox. However, by manipulation of a hand winch gear the fitting hinges down and the louvre slides out so that when eventually fitted on site it can be serviced from the floor level





UNUSUAL but remarkably effective is a new pattern of recessed laylight designed and produced by the Edison Swan Electric Co. Ltd. to meet a special order from a large organisation.

Intended for fixing originally in a B.E.A. control room where operations would have been hindered by the use of ladders and staging, this fitting was to be arranged so that servicing could be carried out by a single person and at floor level.

One of these laylights and its method of operation is illustrated in the pictures reproduced on this page. The laylight comprises a fixed outer frame in which is hinged a sub-frame carrying the lamps and reflectors. Within the hinged section a louvre is fitted, arranged as a sliding extension which opens progressively as the frame is opened. The reverse takes place when closing the frame. The whole operation is controlled as one sequence either way by the operation of a self-sustaining hand winch.

The risk of undesired opening and damage is averted by the incorporation of an automatic catch which has to be released before the winch will take the load for lowering.

Instant start control gear is mounted on the steel structure of the ceiling in the form of unit assemblies feeding one lamp. Special plug and socket connections permit the service engineer to carry out isolation tests for replacement of defective components or lamps.

The principle of operation, which depends on a simple winch and pulley gear, is applicable to all types of louvred or glazed laylights, and the cost is proportional to the size of fitting involved. We understand that applications for patents have been made.

overseas news

Brisbane's Hope

In Brisbane, there is keen interest in the building operations at the City Electric Light Co.'s new Bulimba power station and the city council's new generating station at Tennyson. For it is realised that on progress made in the next few months will depend whether Brisbane is to face further power cuts next winter. It has been pointed out that physical construction on the site, not shortage of plant, was the factor governing whether part of these new stations would be operating before next winter. The two existing power-houses, which have an aggregate output of 170,000 kilowatts, are overloaded, but rationing had been effective in easing the load and maintaining the 15% cut sought. The two new stations, when completed, will provide an additional output of 240,000 kW. The company's 10,000 kW package plant is expected to be operating near Ipswich by the end of the year, and the council's similar package plant at Tennyson shortly afterwards. In addition the 3,500 kW hydro-electric plant should be operating at Somerset Dam before next winter. The combined output of these three plants, however, will do little more than cater for the normal 10 to 15% annual increase in South-East Queensland's electricity demand.

Helping Local Industry

Sydney County Council has now decided to help the Australian electrical industry to the extent of £26,000 by splitting up the order for 225 circuit-breaker panels for 5/11 kV substations, to which we originally referred on July 3. It will be recalled that A. Reyrolle and Co., Ltd., quoted a figure of £160,071 while the nearest Australian tender, by Australian General Electric Pty., Ltd., was for £237,145. Reyrolle's are now being asked to supply 150 units and the remaining 75 will be provided by the Australian concern. When the Council deferred acceptance of the tender originally it instructed the general manager of the undertaking, Mr. C. J. Craggs, to ask if Australian firms could submit lower tenders in view of altered circumstances. Mr. Craggs has since reported that no Australian manufacturer would be able to reduce its offer appreciably if fresh tenders were called, and overseas tenders might not be so advantageous as those under consideration if new tenders were called.

Saskatchewan Expansion

Contracts have been let for the construction of extensions to the Saskatchewan Power Corporation's plants in Unity and Saskatoon. The extension to the Unity plant is to house two new gas engine generating units. Capacity of that station, which is the only plant in the province using natural gas as fuel, is being increased by the addition of an 1,800 kW unit this month, and with another 2,500 kW unit scheduled for delivery in May, 1953. The addition of these two units will make the Unity plant the largest engine generating plant in the province. Present capacity of the Unity plant is 2,150 kW. The Power Corporation also plans to build 69 kV lines from Unity to North Battleford and from Unity to Kindersley to make power from the more economically operated Unity plant available to a larger area in the north-west part of the province, with delivery of the equipment to be made next spring. This extension is in addition to the one now being built to house another 25,000 kW turbo-generating unit which is expected to be installed this year. Total cost of the two-year programme at Unity will be $750,000, while the work at Saskatoon will cost $3,000,000.

Manitoba Seeks Power

The Manitoba Power Commission has notified the Winnipeg Electric Co. that its peak load next winter may be about 25,000 h.p. more than last year and that it will expect the company to supply the additional requirements. The company has answered it may be unable to do so because present contracts and other commitments may require all the power it can deliver. It has suggested that the Commission should obtain the additional power it may need from the province's new plant at Pine Falls. Two units of 19,000 h.p. each are already completed and able to deliver their capacity, and the other four are to be completed by August. But locally there is doubt whether power from the Pine Falls plant could be delivered at the price the Manitoba Power Commission is paying under its present agreement with the Winnipeg Electric Co. Under the agreement the Commission each year has to give the company three months' notice of additional power it may need. At present the company is supplying the Commission about 90,000 h.p. Last year the peak load supplied at one time was 108,000 h.p. The Commission has estimated that next winter the maximum of its peak load may be 133,000 h.p.

Steel Needed

During his vacation-cum-business trip to this country (to which we referred last week), Mr. R. H. Saunders, chairman of the Hydro-Electric Power Commission of Ontario, is searching for supplies of steel in Europe which will enable the Commission to complete the major construction works now under way. This need for alternative supplies of steel is the result of the U.S. steelworks strike, and the problem is causing the Commission immediate anxiety. Work on the power

line from the new Sir Adam Beck-Niagara No. 2 station was held up several days this month by a lack of steel towers, and the Commission has been unable to get special steel necessary for construction of the penstocks at that station. The only reason the Niagara development—last major phase of the 10-year expansion—has advanced so far is because of a 13,000-ton steel order Mr. Saunders was able to place in Luxembourg on a previous overseas trip. In the last two years the Commission has also bought $15,250,000 worth of turbines, boilers, and h.t. towers in Britain.

Power Study

More than 50 Canadian and American officials and representatives of private industry attended the fifth meeting of the International St. John River Engineering Work Group recently, when the potentialities of proposed hydro-electric power sites under study along the Upper St. John River system of northern Maine and the provinces of Quebec and New Brunswick, were again considered. Following the meeting, an inspection was made of some of the proposed sites. The St. John River drains a total watershed area of some 26,000 square miles. It serves as a boundary between Canada and Maine and empties into the Bay of Fundy. The second largest stream on the Atlantic seaboard, it is 450 miles long.

Artisans Needed

Owing to the acute shortage of skilled artisans needed for the Corporation electricity undertaking, the Cape Town City Council has been seeking recruits from England and the Continent recently. A number have now been secured, but it is realised that before they can be brought out housing accommodation, which is almost unobtainable, will have to be provided for them. To this end the City Council decided to build 28 dwellings at a cost of nearly £50,000, and work is now proceeding on some of the houses. It has been reported to the Council that owing to the shortage of skilled mechanics it has not been possible to keep the power station plant, etc., in an efficient condition by regular routine inspection and testing, and that the loss of efficiency was causing extra coal to be consumed to the value of £15,000 a year. Also that it is taking the present staff all their time and a good deal of overtime just to cope with repairs and to do those jobs that are essential to keep the plant from breaking down. So serious is the position that even if present vacancies can be filled it is estimated that it will take something like two years to overtake deferred repairs and maintenance and to restore many items of plant and equipment standing idle, dismantled and in a state of disrepair because man-hours are more urgently required on more important items of plant. Recently a local engineering firm had to be employed to carry out most urgently needed repairs and overhauls to certain plant at a cost estimated to be something like twice, if not more, than it would have been had the power stations enough artisans to carry out regular routine maintenance and repairs.

New Uganda Power Line

A proposal for the construction of a power transmission line from the Owen Falls hydro-electric station, now under construction, to the Kilembe Mines, to cost approximately £2,000,000, has been the subject of discussions between representatives of the mines, and Mr. C. C. Spencer, financial secretary, and Mr. C. R. Westlake, chairman of the Uganda Electricity Board. The parties agreed on the construction of the line on the basis of a substantial capital contribution by the mining company to the Uganda Electricity Board together with an annual payment for the bulk supply. The agreement is subject to the approval of the Board and of the Government of the Uganda Protectorate, but no difficulty is anticipated in that direction.

132 kV Line for Pakistan

The transmission section of the Punjab Public Works Department (Electricity Branch) has started work on the erection of a 132 kV transmission line between Wah and Jhelum. This line, which will be nearly 100 miles long, will link the electric supply system of North Western Frontier Province with that of the Punjab to enable the latter to take a supply of power from the Dargai hydro project. According to an agreement, the Punjab is to receive a basic supply of 8,000 kW from the Frontier Province via this transmission line which, together with substations at Rawalpindi, Gujjar Khan and Jhelum, is expected to be completed in about a year's time. Locally, however, it is considered that the most significant feature of the project is that for the first time in the history of the Punjab the construction of an e.h.t. line is going to be undertaken by the Electricity Department itself. This means that both the field work and its supervision will be done by Pakistani engineers. Previously work on such high-voltage lines has either been carried out by foreigners or under foreign technical supervision.

Roxburgh Gorge Contract

The tender of the U.K. firm of Holland, Hannen and Cubitts for the civil construction work for the Roxburgh Gorge hydro-electric project on the Clutha River at Otago, South Island, has been accepted by the New Zealand Government. The amount of the tender was £8,620,714. The U.K. firm will be associated with the Swiss concern of Conrad Zschokke, Zurich, and a New Zealand company is to be formed to handle the contract. Apparently 40% of the 1,300 workmen to be employed on the job are to be brought from overseas. When completed, the Roxburgh Gorge power station will have a capacity of 320 MW, made up of eight 40 MW sets. A concrete dam 1,200 ft. long and 250 ft. high, will be built, raising the river level by 145 ft. and forming a lake approximately 25 miles long.

PERSONALITIES

IN THE INDUSTRY

We learn that **Mr. G. H. Foot,** B.Sc. (Eng.), A.C.G.I., A.M.I.E.E., has recently joined the Equipment Division of Mullard, Ltd., and has been placed in charge of the telephone product group. He has had extensive experience in world telephone practices, both operating and manufacturing. For some years he was with the Companhia Telephonica Brasileira in Rio de Janeiro, and prior to that was with Siemens Brothers, Ltd., at Woolwich.

Mr. G. H. Foot

Mr. C. Salthouse has now succeeded Mr. J. White as street-lighting and transport supervisor to Heywood Corporation. Previously with Burnley Corporation, he earlier served with the Berkeley Electrical Engineering Co., Vickers Armstrongs, at Barrow, and with the Lytham St. Annes Corporation.

The general council of the British Standards Institution has elected **Mr. John Ryan,** C.B.E., M.C., as its chairman to succeed **Sir Roger Duncalfe,** who has completed his three years' term of office. In the course of last week's annual general meeting of the Institution, the **Rt. Hon. Viscount Waverley,** P.C., G.C.B., G.C.S.I., G.C.I.E., F.R.S., was re-elected president for the third year, and **Sir Roger Duncalfe** was elected vice-president. The new chairman, Mr. J. Ryan, is vice-chairman of the Metal Box Co., Ltd.

The Liverpool City Lighting Committee has received notification of the impending retirement on superannuation of **Mr. J. F. Wainman,** A.C.I.S., chief administration assistant in the department, who has served nearly 49 years with the electricity department. He entered the Corporation service at the age of 16 years, and has served under six chief engineers. He retires on October 31.

District consumers' engineer in the Stalybridge district of the North Western Electricity Board, **Mr. G. Taylor,** A.M.I.E.E., was recently the recipient of a presentation by **Mr. E. Binns,** A.M.I.E.E., M.I.Mech.E., No. 3 sub-area manager, on his retirement. Mr. Taylor originally started with the Ashton-under-Lyne Corporation undertaking in 1900.

Mr. W. Butler, A.R.T.C., A.M.I.E.E., has now taken up duties as consumers' engineer of the Bury district of No. 2 sub-area of the North Western Electricity Board. He was previously assistant power sales engineer with the Board's No. 1 (Manchester) sub-area, a position he has held since 1950. A native of Salford, he was educated at De La Salle College, where in 1930 he was college gold medallist and matriculated with distinction in five subjects. He was employed by Salford Corporation Electricity Department from 1930, except for army service, until vesting day, when he was development assistant to the consumers' engineer.

Mr. W. E. Loveridge has retired from the Board of Richardsons Westgarth and Co.

Two new sub-area managers have been appointed by the Eastern Electricity Board. In the Suffolk sub-area **Mr. Percy Sydney** is the new manager in succession to **Mr. H. J. Wright,** who has gone to Canada (as we noted in our May 15 issue), and **Mr. S. F. C. Whitmore,** A.M.I.E.E. has been appointed manager of the Chilterns sub-area, in succession to **Mr. P. G. Campling,** M.B.E., M.I.Mech.E., M.I.E.E., who has retired. For many years Mr. Sydney was general manager of the Cambridge Electric Supply Co., and since nationalisation, has been commercial officer of the Fens sub-area which supplies a large rural territory, including the cities of Cambridge and Peterborough with several large industrial consumers. Prior to becoming general manager of the Cambridge company he had been manager of the Frome district for the Wessex Electricity Co., and personal assistant to the managing director of Edmundsons Electricity Corporation, Ltd. Mr. Whitmore was manager of the North Essex Division of the East Anglian Electric Supply Co. before vesting day, and since then has been manager of North Essex District of the Board. Prior to the war he was resident manager at Stowmarket for the East Anglian Co., for about two years, after a period as assistant engineer there during which he dealt with the change-over from d.c. to a.c. Mr. Whitmore has passed through the Administrative Staff College at Henley-on-Thames.

Mr. Percy Sydney

Mr. S. F. C. Whitmore

Today, July 31, brings the retirement of **Mr. J. Williams,** A.M.I.E.E., who has been technical engineer to the London Division of the B.E.A. since vesting day. Prior to 1948, he had been technical engineer to the South East and East England District of the Central Electricity Board since June 1929. He was, in fact, the first member of that Technical Department to be appointed and consequently had to collect staff and organise the section. Many of the engineers who served under Mr. Williams' guidance have moved on to other and more responsible positions in various parts of the country. To commemorate his retirement, the technical engineers for the whole of the country, together with some head office B.E.A. officials, recently gave a dinner to Mr. Williams at Frascati's. His numerous friends will join in wishing him a long and happy retirement.

Mr. J. Williams

We learn that **Mr. E. C. Green** has been appointed special representative in Great Britain of the Aberdare Electric Co., Ltd., of Dublin. This firm specialises in the manufacture of Thermodare night storage space heaters. Mr. Green may be contacted at Little Reeves, Amersham Common, Bucks.

Mr. A. Robert Jenkins, J.P., A.I.Mech.E., deputy managing director of Robert Jenkins and Co., Ltd., Rotherham, was installed as president of the Institute of Welding for the 1952-53 session at the annual general meeting last week. The new vice-president of the Institute is **Mr. H. B. Fergusson,** M.I.N.A., M.I.Mech.E., M.E.I. canada, who for 15 years has been a director of G. A. Harvey and Co. (London), Ltd.

Mr. J. H. Fairhead, of Boston, Lincs, who has for some time been a commercial engineer with the East Midlands Electricity Board, is to leave his present position next month to become manager for Eric Winfield, Ltd., of Boston, and he plans to concentrate on electrical contracting, we hear.

Technical and staff instructor at one of Hoover's training schools at Nottingham, **Mr. K. Pugh,** has been appointed district manager at Bournemouth to that firm.

Three new directors have been appointed to the board of the General Electric Co., Ltd. They are **Mr. R. C. Giggins,** manager, Government department; **Mr. J. J. Gracie,** C.B.E., M.I.E.E., M.I.P.E., F.I.A.A., Hon.A.C.T.(Birmingham), general manager, Witton Engineering Works; and **Mr. T. B. O. Kerr,** secretary of the company. Mr. Giggins gained much of his early experience in Malaya, first at the Singapore branch of Fraser and Chalmers Engineering Works, then at G.E.C.'s first branch office there, at Kuala Lumpur, and between 1929 and 1938 as G.E.C. general manager, British Malaya, when his activities extended to Java. He assisted in the initial stages of the electrical development of Malaya, and was also one of the pioneers, and later chairman, of the British Malayan Broadcasting Corporation. In 1938, he was transferred to London and shortly afterwards was appointed manager of the Government department. During the war he was directly interested in equipment for the Forces and was a leading participant in the negotiations in connection with the company's shadow factories and extensions. After the war he carried through negotiations for the acquisition of war-time factories. Apart from a break of about six years, Mr. Gracie has had a long and noteworthy career with the G.E.C. organisation. Starting with the Osram lamp works in 1921 as technical assistant, he was shortly afterwards transferred to the production staff. At the M.O. Valve Co. he introduced quantity production methods in the manufacture of radio valves, and in 1928 returned to the Osram lamp works where he was placed in charge. In 1931, he left the G.E.C. and joined a well-known firm of consulting engineers, and as chief engineer, supervised the re-organisation of a number of Midlands factories. In 1937, he became general manager and director of Coldair Ltd., a G.E.C. subsidiary, and supervised the erection and layout of the new Wembley factory. A year later he was appointed commercial manager of Witton Engineering Works and in 1940 became general manager. Mr. T. B. O. Kerr has been secretary of the company since October, 1949, He is also a director of Woods of Colchester, and of the G.E.C. Pension Fund Trustee Co. He started with the company in 1930, and after a period as outside representative of the sales dept. joined the staff of the late Mr. M. J. Railing in 1932. He became personal assistant to Sir Harry Railing in 1935, and from then till 1947 was assistant secretary to the company.

Mr. J. J. Gracie

Mr. R. C. Giggins

Mr. T. B. O. Kerr

One of the earliest members of the staff of the General Electric Co., Ltd., **Mr. E. G. Baker,** who retired from the firm in November, 1940, after 57 years in the company's service, celebrated his diamond wedding anniversary on Wednesday of last week. Mr. Baker, who is now 84, started with

Mr. & Mrs. Baker reading congratulatory messages

the G.E.C. in 1893 as office boy to Mr. Gustav Bing at Aldermanbury Street, E.C.4, and was one of a staff of three. Subsequently he served under Mr. Hugo Hirst (later Lord Hirst) at Queen Victoria Street; there he was left in charge of the wire department during Mr. Hirst's frequent visits abroad, and when the company took over its present premises in Kingsway, he temporary took full charge of that department.

Mr. G. W. Alexander and **Mr. A. T. Purse** have been appointed directors of Powell Duffryn Technical Services, Ltd.

The Minister of Fuel and Power has made a number of appointments and re-appointments to the Merseyside and North Wales Electricity Consultative Council. The Council is now constituted as follows: Chairman: Mr. H. Evans (Liverpool); Deputy Chairman: Alderman J. C. Bardsley, M.A., J.P. (Appleton); Members: Alderman W. H. Bellis, LL.B. (Southport), Cllr. F. H. Cain (Liverpool), Cllr. Mrs. E. Chamberlain, M.B.E., J.P. (Bangor), Mr. D. Crabbe (Speke), Mr. G. R. Douglas (Bebington), Mr. E. J. Evans, M.SC., M.I.E.E., M.I.Mech.E., A.M.I.C.E. (Port Sunlight), Mrs. H. Harry, B.A. (Harlech), Alderman J. E. Hughes, J.P. (St. Helens), Cllr. R. Jackson (Maesbury), Cllr. J. John, J.P. (Aberystwyth), Mr. J. A. Johnson (Holywell), Cllr. E. Jones, J.P. (Wrexham), Alderman S. Mahon, O.B.E., J.P. (Liverpool), Alderman R. Matthewson, J.P. (Chester), Mrs. E. B. McNeill, M.A. (Bebington), Mr. J. E. Nelson, M.I.E.E. (Runcorn), Cllr. E. H. Parry (Dyffryn Ardudwy), Cllr. A. Roberts (Crewe), Mrs. D. S. Smith (Liverpool), Cllr. O. Thomas (Portmadoc), Cllr. W. Thomas (Holyhead), Cllr. P. T. Trehearn, J.P. (Rhyl), Major E. Turnour (Groes), Mr. W. A. Tutton (Welshpool), Alderman J. Village (Liverpool) and Alderman J. H. Wensley, J.P. (Wallasey).

Mr. W. E. Miller, M.A.(cantab.), M.Brit.I.R.E., has been nominated president-elect of the British Institution of Radio Engineers for 1952-53. A member of the Institution for 20 years, he was elected a vice-president in 1948, having previously been chairman of the general council. He has also served on six of the standing committees of the Institution and was one of the original signatories to the incorporation of the Institution in 1932.

Mr. D. H. Thomas, M.SC. (Tech.), B.SC. (Eng.), A.M.I.E.E., A.M.I.R.E., head of the Department of Electrical Engineering at Rutherford College of Technology, Newcastle-upon-Tyne, has been authorised by the City's Education Committee to visit new technical colleges at Coventry and Rugby in connection with the design of new electrical engineering laboratories at Newcastle.

Mr. A. C. Edrich, A.M.I.C.E., has been appointed an officer of the London Transport Executive with the title of permanent way engineer (railways). He entered the service of the Metropolitan District Railway in 1930 as an apprentice at Lillie Bridge. In 1934 he became an engineering cadet and rose by 1938 to liaison assistant for engineering works on the Bakerloo Line in connection with the 1935/40 new works programme. He was appointed senior assistant to the permanent way engineer (railways) in 1944.

Mr. G. A. Nott has been appointed by the Minister of Fuel and Power as a part-time member of the Midland Electricity Board. Mr. Nott is a member of the Executive Committee of the Worcestershire National Farmers' Union, and a director of British Canners Ltd.

Sheffield University Council has announced the appointment of **Mr. P. H. Price,** B.SC., research assistant to the Professor of Fuel Technology, to be lecturer in fuel technology.

OBITUARY

Mr. A. H. Hoggins, who had been associated with Walsall Conduits, Ltd., for 32 years, and a director since it became a public company in 1936, died on July 22, aged 67. Mr. Hoggins was also manager of the Tube Mills Dept.

Wills.—Mr. L. P. Freeman, A.M.I.E.E., managing director of Aron Electricity Meter Ltd., left £11,466 gross (£10,026 net value).

Mr. P. G. Spary, B.SC., M.I.E.E., M.Eng., A.M.Inst.C.E., M.A.I.E.E., senior lecturer in electrical engineering at University College, Southampton, left £10,845 gross (£9,848 net value).

Mr. F. Thursfield, M.Inst.C.E., M.I.E.E., formerly general manager of the Leicestershire and Warwickshire Electric Power Co., left £22,125 gross (£21,915 net value).

Mr. R. G. Ward, M.I.E.E., formerly for many years associated with John Brown and Co. Ltd., left £996 gross (£922 net value).

Survey of Canada's Homes

EXTENT OF "HOUSEHOLD MECHANISATION" REVEALED

EIGHTY-SIX per cent. of households in Canada were taking a supply from the public electricity mains last year, according to census figures just issued by the Dominion Bureau of Statistics. The information, derived from a 20% sample survey carried out by the Bureau, and relating to 1951, should be of considerable assistance to British manufacturers of domestic electrical appliances interested in the Canadian market.

The table below* shows the total number of households in the Dominion, the various provinces, and in cities of over 30,000 homes, with data on the various appliances installed.

The census lists the percentages of Canadian households which have certain conveniences as follows:—

Convenience	% of total	Convenience	% of total
Electricity	86	Radio Sets	92
Washing machines ...	73	Refrigerators	47
Vacuum cleaners ...	42	Electric cookers ...	29
Telephones	60	Gas cookers	21

Compared with data for the year 1941, a total of 1,143,883 additional households have been connected up throughout the Dominion since that date. Broken down, it is shown the extra connections for each province over the

CANADIAN HOME APPLIANCE MARKET BY PROVINCES, CITIES OF OVER 30,000, 1951

Locality	Total	Electricity (power-line)	Washing machines	Electric vacuum cleaners	Radio sets	Refrigerators Mechanical	Electric cookers	Gas cookers
CANADA	3,407,605	2,924,550	2,483,525	1,420,055	3,146,530	1,600,930	977,505	726,600
Newfoundland	70,895	36,365	18,575	4,535	56,830	5,335	3,250	——
St. John's	10,605	10,485	6,420	2,355	9,920	2,385	1,445	——
Prince Edward Is. ...	22,480	11,310	9,685	3,935	20,170	4,275	1,575	335
Nova Scotia	149,625	133,520	97,380	42,155	135,435	45,700	17,350	3,330
Halifax	18,765	18,690	11,625	7,835	17,480	9,285	4,830	2,915
Sydney	6,355	6,330	5,350	2,770	6,140	2,710	1,330	120
New Brunswick	114,060	97,015	74,995	30,030	101,315	29,765	12,200	6,045
Saint John	13,215	13,200	8,155	5,035	12,355	4,180	3,175	140
Quebec	858,555	793,820	647,385	284,540	803,315	402,595	143,445	242,870
Hull	9,335	8,840	8,020	2,325	8,895	4,320	4,970	110
Montreal	248,110	246,500	164,985	108,515	238,705	152,020	31,135	185,990
Outremont	7,415	7,415	4,295	5,160	7,290	6,610	1,125	6,225
Quebec	35,045	34,520	24,910	13,075	34,210	19,430	12,390	6,540
Sherbrooke	11,505	11,490	9,750	5,490	10,970	6,965	1,995	4,820
Trois-Rivieres ...	9,505	9,470	8,350	4,335	9,270	4,605	2,890	750
Verdun	19,775	19,740	14,910	11,280	19,280	11,845	1,325	16,735
Ontario	1,180,080	1,109,355	929,790	649,410	1,098,755	730,035	573,395	308,125
Brantford	10,380	10,380	8,945	7,020	9,770	6,375	4,860	5,155
Fort William ...	9,295	9,290	8,175	5,710	8,750	5,050	6,925	——
Hamilton	55,340	55,260	42,000	34,485	52,645	41,525	25,045	29,100
Kingston	8,695	8,670	6,690	5,015	8,280	6,920	6,050	1,670
Kitchener	11,575	11,575	9,990	8,355	11,185	8,100	7,450	3,945
London	26,315	26,305	20,550	17,400	25,320	18,420	11,740	14,155
Oshawa	11,225	11,190	9,635	7,040	10,710	7,475	8,675	715
Ottawa	48,955	48,340	36,600	29,120	46,560	36,630	41,835	2,370
Peterborough ...	10,025	9,985	8,675	6,375	9,545	7,170	6,325	1,885
Port Arthur	8,415	8,405	7,180	5,055	8,035	4,350	6,155	——
St. Catharines ...	10,405	10,395	8,515	7,045	9,780	7,825	5,130	4,985
Sarnia	9,380	9,360	8,145	6,270	8,845	6,685	3,830	5,125
Sault Ste. Marie ...	7,865	7,840	6,860	4,375	7,360	5,130	4,220	2,095
Sudbury	9,460	9,460	7,700	4,565	9,005	6,200	7,535	——
Toronto	157,205	157,065	113,190	102,335	149,055	110,320	56,605	97,430
Windsor	31,820	31,805	26,675	21,530	30,000	21,280	17,505	13,915
Manitoba	202,390	165,095	141,075	83,710	187,055	95,170	99,120	7,280
Winnipeg	64,700	64,615	44,545	38,440	62,345	42,500	50,305	6,470
Saskatchewan	221,755	107,830	149,790	57,295	204,745	49,830	31,430	9,965
Regina	19,220	19,075	15,635	11,835	18,535	9,870	10,810	440
Saskatoon	15,030	14,915	12,190	8,850	14,520	6,865	6,525	880
Alberta	251,005	165,190	179,190	93,190	230,945	88,055	17,210	105,350
Calgary	37,705	37,600	29,145	25,480	36,640	22,245	3,305	33,765
Edmonton	43,090	42,655	34,450	25,225	41,210	23,640	4,190	36,145
British Columbia	336,760	305,050	235,660	171,255	307,965	150,170	78,530	43,210
Vancouver	101,510	101,300	69,950	62,110	95,365	54,935	32,515	30,970
Victoria	15,810	15,770	9,405	9,755	15,050	6,620	3,455	4,315

* Exclusive of hotel, institutional and camp households.

same period were: Prince Edward Island, 5,712; Nova Scotia, 55,167; New Brunswick, 46,787; Quebec, 304,045; Ontario, 371,154; Manitoba, 73,327; Saskatchewan, 43,386; Alberta, 80,988, and British Columbia, 126,932.

Comparison with 1941 figures also indicates changing tastes, in that mechanical refrigerators have been replacing ice boxes. In 1941 there were 660,000 ice boxes and 539,000 mechanical refrigerators installed in Canada. By last year the figures were 622,000 ice boxes and 1,600,000 mechanical refrigerators. The data reveals information for the market analyst, but others may be interested in the disclosure that although the census reveals that there are 3,146,530 households in Canada with radio sets, the licensing records state there are 2,212,435 who have paid their $2.50 fee!

High Capacity Switchgear Testing

WITH the increasing trend toward higher transmission voltages, the testing of switchgear presents greater problems. The main difficulty in testing lies in obtaining fault currents of sufficient magnitude and severity to test the switch so as to obtain basic data to assess its actual operation on a large interconnected system. Both in America and France, testing is carried out on the actual high-tension systems of the countries, but there is always a remote danger of possible interruption to general supply.

A new and comprehensive independent switchgear laboratory has, however, recently gone into operation in the United States. Erected by the General Electric Co., near their switchgear works at Philadelphia the testing site is claimed to contain the two largest generators ever built for this duty. A full description of the plant is contained in *Electrical Engineering* for July, 1952.

Alternators

Two alternators, to run in parallel, have been installed, and together they can deliver a total of 3,200 MVA, symmetrical in the first ¼ cycle, 3-phase at 15·5 kV. These 1,800 r.p.m. machines, each nominally rated at 125 MVA have been designed with an unusually low slope decrement so that the symmetrical current at the end of 5 cycles is still approximately 75% of the initial symmetrical short circuit value.

Each generator is driven by a 4·16 kV 3,000 h.p. wound-rotor induction motor equipped with automatic starting and with liquid rheostats in the rotor circuits to give stepless control of speed over a range of 8 cycles. Dynamic braking is used to stop the machine within 15 minutes, which avoids the long coasting time inherent in machines of this type and size. It is also of interest to note that equalising of rotor shaft cooling is obtained by a fitted barring gear and pony motor. Arrangements have also been made to provide super-excitation if this is found necessary.

The generators are wound for 15·5/7·75/8·95/4·475 kV star or delta, and on a 3-phase short circuit at 15·5 kV at the test cell location, 61,000 amp or 1,600 MVA symmetrical and 100,000 amp or 2,700 MVA asymmetrical (fully offset) can be obtained from each machine at ¼ cycle after the short circuit is applied.

Transformers

100 MVA single-phase power transformers are used to supply the high voltage test area with supplies up to 440 kV single phase, and provision has been made for 3-phase supplies at 220 kV with future extension up to 380 kV.

For special high current testing, a bank of three 24 MVA single-phase transformers can be used to supply currents up to 400,000 amp symmetrical in one of the test cells, at 1,200 V.

The 100 MVA single-phase transformers for high voltage work have 7,750/15,500 V primary, 38/72·5/84/140/220 secondary, with 2·99 to 7·6% reactance. They can be connected in parallel for single-phase high capacity tests, in open delta (2), and in star (3) for three-phase tests, in series for 440 kV tests and as auto-transformers for intermediate voltage steps.

The test yard includes two banks of 10,800 kVA capacitors which can be connected in numerous series-parallel combinations. These are for the testing of interruptors used in the switching of transmissions and sub-transmission lines, and for capacitor charging. They can simulate line charging currents for lines up to 200 miles in length at 230 kV.

Two main buildings have been erected in addition to the test yard. One, the control building houses the centralised control and instrumentation equipment, and is fitted with shatterproof windows overlooking the test cells. The main building contains the power source equipment, distribution gear, c.b.'s, etc.

The BUYER'S *Column*

New Ironclad Switchgear

A NEW range of ironclad switch fuses and fused switches has recently been introduced by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. Prominent feature of the new designs is the pleasing external appearance of the units, particularly the absence of any projections. The pressed-steel cases, with interval fixing holes, are provided with cast-iron covers fitted with gaskets.

Ample wiring space has been allowed inside the cases. Cables entering and leaving the switch fuses by the following alternative ways: (a) incoming at the bottom, outgoing at the top and (b) the opposite way; (c) incoming and outgoing at the top and again (d) in the reverse manner. In order to facilitate still further wiring and the making of connections, the spindle carrying the switch blades can be removed merely by axial pressure against a retaining spring.

Instead of the flexible type of connection that has usually been fitted in this type of unit, there is a solid brass bar connection between the switch and the fuse. This should prevent overheating of the contacts, a trouble which has been frequently encountered in the past when the flexible connections have not always been properly fastened.

The action of the switch units is smooth and positive, q.m.b., and double break. The range covers switch fuses from 15 to 100 amp, with semi-enclosed or h.r.c. fuses, and fused switches from 100-500 amp, with h.r.c. fuses only.

A complete range of G.E.C. switchboard components and accessories is now planned for use with this new switchgear. The components include bus-bar chambers, pedestals and support bars, cable sockets and boxes, glands, metering chambers, reverse entry and adaptor boxes.

A New "Lightspot"

NEW version of the "Lightspot" illuminated bell push has been announced by V. & E. FRIEDLAND, Lower Heys Mill Black Lane, Macclesfield.

Smaller than the original model its slender lines fit in easily at any door. In the narrow black plastic body is fitted a translucent bell push supplied in red, amber or green.

For use with any transformer operated bell buzzer or chime, but not with those operated by batteries, the Lightspot is fitted with a special 16 V 2·5 W festoon lamp which has a life of approximately 500 burning hours.

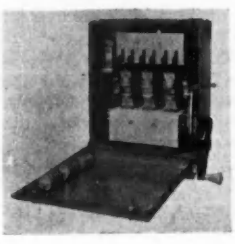
Spring members in the push are made from high-grade phosphor bronze. Provision is made for easy wiring. Each unit is packed in two colour carton, complete with plated screws for fixing. Retail price is 4s. 3d.

Clean Efficient Forging

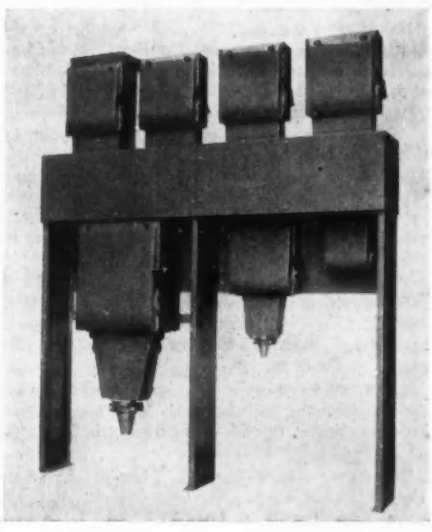
THE publication of technical literature by BIRLEC LTD., Tyburn Road, Erdington, Birmingham, describing an induction bolt heater, focuses attention on the improvement of working conditions and consequent rise in efficiency which has come about as a result of the application of induction heating equipment in forge and foundry.

Smoke, dirt and dust so common to the old style shops has been eliminated and advantages such as reduced scale formation and the subsequent improved surface finish, dimensional accuracy and die-life, automatic operation and the absence of wasteful heating-up or standby periods have been brought about by the readily controlled heating which is a principal virtue of the induction heater.

The publication referred to earlier describes a Birlec induction bolt heater designed in a standard range of sizes for ½-in. to 1¼-in. stock. An example



Left.—This G.E.C. fused switch has cover removed to show the design features



Right.—Switchboard assembly built up from the new G.E.C. components shows the overall cleanliness of design

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of the speed and efficiency of this model shows that total direct operating costs are 8s. 6d. per 1,000 pieces when heating $\frac{3}{4}$-in. bolt pins with a production rate of 1,500 pins per hour.

Price Reductions

THE prices of the company's D.C. 438 and 438E electric cookers have been reduced according to a recent statement by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

Model D.C. 438 now costs £25 instead of £26 5s., whereas the D.C. 438E at £26 represents a reduction of £1 6s.

Helvin Cable Straps

THE introduction of "Helvin" cable straps by HELLERMAN ELECTRIC LTD., Tinsley Lane, Crawley, Sussex, will enable cabling looms to be secured in an instant, doing away with the need to lace these cable forms.

Made from flexible p.v.c. strip, $\frac{5}{16}$-in. wide and perforated every $\frac{1}{4}$ in., these straps can be used to secure a loom of any size overall diameter. Fixing is by a rigid p.v.c. stud through the perforations.

Supplied in any required length, complete with studs, the Helvin straps will certainly shorten time required for binding cable looms.

Storage Battery Equipment

A STUDY of the first complete catalogue of stationary battery equipment, to be issued by CHLORIDE BATTERIES, LTD., Clifton Junction, nr. Manchester, shows what a really complete service the firm offers.

Apart from a detailed description of the range of batteries for lighting and power purposes in generating stations, telephone exchanges, houses, factories and various institutions, and notes about the emergency lighting equipment for banks, shops, hospitals, theatres and all public buildings operated by the "Keepalite" automatic equipment, this catalogue tells of the staff of engineers who will undertake the installation of batteries in any part of the country and who will carry out a periodical examination of customers' batteries at a nominal fee.

Battery-charging equipment and control units have been a special study for the firm who are prepared to assist in the preparation of specifications, or quote for the necessary plant.

TRADE PUBLICATIONS

TELECOMMUNICATIONS.—"An Outline of the Industrial Resources and Commercial Activities of the Automatic Telephone and Electric Co., Ltd., London and Liverpool," is the descriptive title of a well illustrated brochure just issued by the firm.

HEATING EQUIPMENT.—New leaflet issued by Eltron (London) Ltd., Accrington Works, Strathmore Rd., Croydon, gives particulars of some of the firm's range of heating elements. It should prove of interest to industrial users who require special type elements for certain equipment.

FANS.—Publication 3201, issued by the Sturtevant Engineering Co., Ltd., Southern Hse., Cannon St., London, E.C.4, explains the advantages of Sturtevant axial-flow fans. It is profusely illustrated with pictures and diagrams.

ACCESSORIES.—Price List No. 23, which came in to effect on July 21 and which was issued by Nettle Accessories Ltd., Harper Rd., Wythenshawe, Manchester, cancels all previous price lists issued by the company. It consolidates all price amendments and includes prices of recent additions to the range.

FLAMEPROOF EQUIPMENT.—The flameproof and safety electrical equipment supplied by the General Electric Co., Ltd., Magnet House, Kingsway, is set out and illustrated in Catalogue 1492, recently issued by the company.

LIGHTING EQUIPMENT.—Industrial lighting gear for use with tungsten lamps is featured in a new brochure issued by Ekco-Ensign Electric Co., Ltd., 45 Essex St., Strand, W.C.2.

FURNACES.—Wild-Barfield Electric Furnaces Ltd., Elecfurn Works, Watford Bypass, Watford, have now issued a booklet, HH 252, which describes the range of horizontal "hair-pin" furnaces produced by the company.

RECTIFIERS.—The fifth edition of Bulletin F/SRT 1, now available from Standard Telephones and Cables Ltd., Connaught Hse., Aldwych, W.C.2, gives codes, dimensions and weights of Sentercel selenium rectifier stacks.

LAMPS.—"Atlas Lamps—All the Better to See With," is the slogan appearing on the front cover of the new Atlas Lamp catalogue, AL/90A, just issued by Thorn Electrical Industries Ltd., 105-109 Judd St., London W.C.1.

SWITCHES.—List No. 127 has been issued by Arcolectric Switches Ltd., Central Ave., West Molesey, Surrey, as a supplement to No. 126 catalogue. It illustrates recent additions to the Arcolectric range.

FOUNDRY WORK.—Since 1947, F. H. Lloyd and Co., Ltd., well-known British steel founders, have controlled the Parker Foundry at Derby. An illustrated brochure just issued by Parker Foundry (1929) Ltd., Tropenas Steel Works, Derby, draws attention to the plant and capacity of the works and the service available.

LIGHTING FITTINGS.—A folder broadsheet illustrating and pricing the range of Atlas fluorescent lighting units has been published by Thorn Electrical Industries, Ltd.,105 Judd St., London W.C.1.

ACCESSORIES.—The A.T.L. terminal block for cables up to 7/052 is fully described in TB(6)52, a leaflet issued by Austin Taylor Electrical Ltd., Ellesmere St., Failsworth, Manchester.

LIGHTING EQUIPMENT.—A new leaflet featuring the non-flameproof prismatic Bulkhead Unit has now been issued by Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.

Electrical Research

E.R.A. Reports discuss circuit-breakers, transformers, and steam piping

FEATURED in two of several recent E.R.A. reports are problems of circuit-breaker operation, of which the first is concerned with current variations at the zero point in a gas-blast circuit-breaker. In the study of arcing phenomena it is realised that conditions at zero current exert a predominant influence on the efficacy of the breaker, but of these conditions very little is known in detail. Consequently this report (ref. G/XT132) concerns itself in the main with detailed considerations of a suitable method of measuring a voltage proportional to arc current and the associated equipment to obtain a close examination of zero-current conditions. In the method discussed, this voltage is derived from a low valve series resistor in the arc circuit, and the voltage across it is measured by a push-pull, direct coupled, cathode follower output amplifier, the design of which receives lengthy treatment. Considerations in the construction of the resistor to minimise inductance are emphasised in view of the comparatively high phase change effects such inductance can have at the current-zero point. Results and oscillograph photographs show that at the zero point the arc current pauses for about five micro-seconds and that the change sets up an oscillation having a frequency of the order of megacycles.

Faults during breaker operation

The possibility of a heavy current fault occurring during the opening time of an oil circuit-breaker is unlikely. It is, however, considered to be of some importance as indicated in report G/T249, which attempts to analyse the pressure increase in an explosion pot under these somewhat rare conditions.

The original problem was to determine the increase in oil pressure in the explosion pot of a breaker in a 132 kV line, when a fault current of 5,000 amps developed during the initial opening of the breaker on a transformer no-load current of 10 amps. Due to insufficiency of plant it was impossible to reproduce the absolute conditions. By observing the effect of passing the full current through fine fuse wire, connected between the breaker contacts at 3·8 kV, it has been possible to deduce a formula from which the pressure changes at 132 kV can be calculated.

Turning now to a somewhat different subject, it has been suggested that, in view of the predominance of mathematics in previous analyses, the fundamental simplicity of the capacitor-transformer has been obscured. In this report (Q/T119), it is shown that this circuit can be developed on the same principles as are used in calculations on normal transformers. The basic equivalent circuit is derived from the loss resistances in the potential divider capacitor and tuning reactance. In consecutive stages, effects of the capacitive exciting current and incorrect tuning are then introduced.

As capacitor transformers are used in conjunction with an intermediate transformer of more normal type, the report concludes with an evaluation of the combination of both equivalent circuits.

Transformer fault currents

A report on the calculation of currents due to faults between turns in transformer windings (ref. Q/T121), can be considered as a sequel to previous reports in which only single-phase transformers wound on one limb were considered. This report covers, in addition, faults in a winding disposed on two limbs, and in the usual types of 3-phase transformers, dealing only with windings connected to the supply.

A problem in the generation of steam has been cracking in molybdenum-steel steam pipes, thought to be due to surface irregularities. The smoother finish of cold drawn piping should tend to reduce this possible cause, but the effect of such treatment on creep resistance was not known. Report J/T154 studies any such effects cold drawing may have. Two types of steel were considered: chromium-molybdenum and molybdenum-vanadium. Results show that, provided the pipes are normalised before use, creep resistance does not deteriorate.

Copies of the reports noted above may be obtained from the Electrical Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, at the prices noted in our "Official Publications" feature, page 208.

The WEEK in NEWS

Joint Meter Reading Scheme Criticised

Variety of Meters would make Scheme Impracticable

A GOOD deal has been said and written about the possibility of a system of joint meter reading now that both the gas and electricity industries have been nationalised. Much depends now on experiments in various districts in the country where the scheme is being tried out. Meanwhile, however, the chief accountant of the N. Western Electricity Board, Mr. A. Heaton, writing in the Board's magazine *Areatopics*, has expressed disfavour with the project.

Mr. Heaton was formerly chief accountant to Manchester Corporation's Electricity undertaking. Mr. Heaton maintains that joint meter reading would increase costs not reduce them. It would, he says, cause a major disturbance, necessitating a complete redistribution of the sequence of meter reading. His main objection lies in variety of meters held by consumers. Joint meter reading would be an easy matter, he wrote, if all consumers had similar meters. The respective proportions of consumers with both gas and electricity meters; electricity meters only; gas meters only; and the ratio of prepayment meters to quarterly meters varies from district to district. There are also those who have both a prepayment meter and a quarterly meter. All those things, he states, would add to the problems of the readers and staff.

AN APPEAL TO DENATIONALISE SUPPLY INDUSTRY!

AT a meeting of the S. Wales and Monmouthshire branch of the R.D.Cs' Association a resolution was passed calling for the distribution of electricity to be denationalised. The motion was defeated by a large majority. A member of the Cardiff council introducing the motion maintained that there had been substantial delays in the supply of electricity. Although the Electricity Boards were not entirely to blame, he said, it was felt that denationalisation was the solution. He also complained of lack of control at district level and asked that greater responsibility be vested in district managers and their staffs.

In opposition to the resolution it was pointed out that although the Boards had their deficiencies, the position did not call for denationalisation. It was even suggested that were it not for nationalisation there would be little hope of getting electricity to rural areas. Service to rural areas had been greatly improved since vesting day. Opinions were divided on whether or not closer liaison between Boards and consumers was necessary.

DISPLAY OF TOOLS AND EQUIPMENT IN MONTREAL

A REMINDER has been received concerning this year's Montreal Tool and Equipment Show which is to take place in the Show Mart Building between November 11 and 14. Situated as it is in a dollar market, appropriate British manufacturers may consider this an admirable opportunity to advertise their wares. Broadly, the exhibition will cater for machine tools, industrial tools and supplies, materials handling equipment, instruments, maintenance, welding equipment, power, electrical accident prevention, equipment and supplies. Standard booths measure approximately 10 ft by 10 ft and we understand that these will be rented at $2 per ft., exclusive of fittings.

U.K. manufacturers wishing to take part should contact their Canadian agents or communicate direct to the Montreal Tool and Equipment Show, 4585 Sherbrooke St. West, Montreal. Organisers are E. M. Wilcox Ltd., 244 Bay St. West, Toronto.

The First Half-Century

The practice of laying the middle wire bare belongs, I believe, almost entirely to the younger school of German engineers, and has not found favour elsewhere. The significant point was the statement of Mr. Trotter, and the applause that greeted it, that the small place where expense must be kept down would be better laid out with overhead wires than with an inferior underground system. If that view is to prevail at the Board of Trade and elsewhere, it is exceedingly good news for the electrical industry now that the towns and villages left still unsupplied are only the smaller and more scattered. Although it has been found that the whole manufacturing life of large American cities can be allowed to hang on the continued integrity of twenty-mile pole lines, let it be granted for the sake of argument that overhead supply is liable to interruptions. If the defect comes it can be easily located and promptly and cheaply repaired. Out-of-sight and more or less inaccessible underground work can hardly be too well done at any price.—*From our issue of July* 31, 1902.

F.B.I. Survey on Research in Industry

A SURVEY of research and development carried out in British industry during the year 1950-1 has just been issued by the Federation of British Industries. It has been based on information obtained from 301 firms who each spent over £2,000 a year on that type of work. The survey shows that those firms spent nearly £24 million on research during the 12 months under review, exceeding by not less that 50% the amount spent in the period covered by the Federation's previous survey. That was carried out in 1947 and it was suggested then that the work might be repeated after five years.

Evidence which supported the conclusion that more was being spent on research was that the qualified staff employed increased by about 52% and the floorspace devoted to such work by some 54%.

Individual firms have not, of course, been named, but an analysis of the 301 examined shows that 28 were involved in heavy (15) and light (13) electrical engineering. In tables at the back of the survey, facts gathered from the questionnaires are detailed. Here the analysis deals with 12 firms engaged in heavy electrical engineering and 13 in light. Taking both together it is found that expenditure amounted to £4,916,000, total staff engaged on the work was 7,711 of which the total qualified staff numbered 1,904.

CUBAN CONTRACTS GO TO S. WALES

NUMEROUS reports have been included in these columns in recent weeks concerning large contracts placed in this country by overseas governments and undertakings. We note this week yet another, valued at $50,000, and comprising sixteen transformers which have now been completed at the works of S. Wales Switchgear Ltd., and despatched to Cuba. The order is a direct result of the director and general manager of the company, Mr. A. J. Nicholas' visit to the U.S. last year. Consequent upon this order and a necessary assurance that delivery dates would be kept, further orders have already been received for equipment for the same territory. A recent order is valued at a further £50,000.

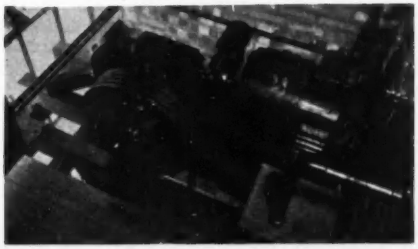
Future of Gaiety Theatre

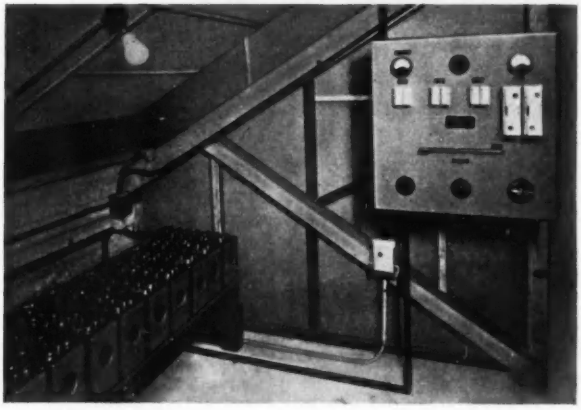
FOLLOWING the dismissal of an action in the Chancery Court last week, the English Electric Co. intend to build offices for the company on the site of the Gaiety theatre in the Strand, London. The theatre would have to be demolished. The action referred to was brought by Mr. H. W. G. Lupino (Lupino Lane) to restrain the theatre's sale by the mortgagees, Crompton Parkinson Ltd., to the English Electric Co. Mr. Lupino is the mortgager. It was dismissed by consent of Mr. Justice Vaisey.

LEAD MARKET TO BE REOPENED

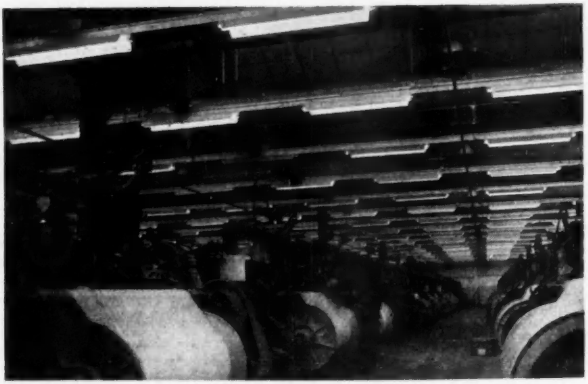
VISCOUNT SWINTON, the Minister in charge of Materials, announced in the House of Lords on Monday that private trading in lead would be restored as soon as the necessary arrangements could be made. Discussions with the trade would be opened almost at once and it was anticipated that this decision would take effect on or about October 1. A further announcement regarding the date would be made shortly.

The Minister explained that the decision had been reached following an improvement in lead supplies, and having regard to an anticipated increase in earnings which will result from the move. From the date of reversion, private imports of virgin lead would be allowed and the London Metal Exchange would re-open for lead transactions. The Ministry would, of course, cease to trade in lead, except to wind up its trading operations.





Motor and winding gear (right) and Nife batteries and control panel installed in Leicester shoe factory to power a lift. This may well be first lift to be battery operated



In order to provide the high level of illumination required for the operation of looms, fluorescent lighting by the trunking system was supplied for the weaving sheds of Tootal Broadhurst Lee Co. Ltd. by the British Thomson-Houston Co. Some 11,765 ft. of extruded aluminium Universal trunking, which also houses instant start auxiliary control gear, has been installed. Vitreous enamelled fluorescent reflectors were mounted in the trunking. Contractors were Rothery (Radio), Ltd.

Who owns Carlisle's Lamp Standards?

A FRESH dispute has broken out in Carlisle with the Electricity Authority, over and above the City Council's decision (reported in our July 10 issue) to oppose the B.E.A.'s claim concerning income tax, in the High Court. The Finance Committee is now asking its Council to refuse payment to both the Gas and Electricity Boards of redemption and interest on lamp standards which existed before nationalisation. Repayment of money which has already been paid is also being sought.

Charges are being made by the Boards on the basis that the standards are their property. At the same time, charges are also being made for maintenance of the standards on behalf of the local authority. The Committee maintains the standards were in existence before vesting day, and are therefore the property of the Council.

E.C.A. PROMINENT AT KENT SHOW

THE local branch of E.C.A. had good reason to be pleased with their exhibit at last week's Tunbridge Wells and S.E. Counties Agricultural Show. The neon Safe Hands sign which was mounted above the fascia of the stand proved an excellent means of attracting attention. It was decided this year to display fewer articles, cutting out the smaller types of electrical apparatus and concentrating on the distribution of leaflets publicising the Association.

OFFICIAL PUBLICATIONS

BUILDING, TRAINING FOR MANAGEMENT. *Special report of Building Apprenticeship and Training Council.* H.M.S.O. 6*d.*

ECONOMY OF BUILDING MATERIALS. *Committee's report for Ministry of Works* (see page 183). H.M.S.O. 2*s.*

E.R.A. PUBLICATIONS
G/XT132 : *Gas-Blast Circuit-Breakers; the Technique of Recording Current in A.C. Power Arcs around the Period of Current Zero, with some Applications*, 15s. 4d. G/T249: *Oil Circuit-breakers—Pressure Set Up by Sudden Increase of Fault Current in an Arc Control Pot*, 18s. 4d. J/T154: *The Effect of Cold Drawing on the Creep Resistance and Structure of 0·5% Molybdenum Steel Steam Piping*, 7s. 9d. L/T266: *On the Vibrations of Long-chain Molecules—I*, 9s. 3d. L/T267: *The Torsional Vibrations of Long-chain Molecules—II* 9s. 3d. Q/T119: *The Equivalent Circuit of the Capacitor Transformer*, 4s. 9d. Q/T121: *The Calculation of Currents due to Faults between Turns in Transformer Windings*, 6s. 3d.

MINES. *Report of H.M. Principal Electrical Inspector of Mines for* 1950. H.M.S.O. 1s.6d.

EDINBURGH'S TRAMS MAY BE REPLACED

LATEST news of tram replacements comes from Edinburgh, where a recommendation that the tramway system should be completely abandoned in the next three years was referred back to the transport sub-committee by the city's Civic Amenities Committee last week. This follows the completion of London's replacement programme only a short time ago, plans for a partial transference in Birmingham, and Doncaster's scrapping of old trams reported in our July 17 issue.

Edinburgh's special sub-committee had been asked to consider to what extent there should be a reduction of trams in view of the proposed expenditure of £300,000 on track renewal. It recommended that the alternative mode of transport should be motor buses, trolleybuses being rejected as unsuitable in the city's centre and in any event one system was more economical and efficient than two. The above loan was available only on the assumption that trams be retained over the repayment period—20 years. This would involve the acquisition of new rolling stock.

First Scholarship Awarded by Birmingham Club

WE learn that the Birmingham Electric Club has just made its first award under the new scholarship scheme inaugurated last year. It will probably be recalled that the scheme is open to part-time students in the electrical department of Birmingham's College of Technology who are under 28. The holder was to be entitled to visit some establishment connected with electrical engineering either at home or abroad.

The first winner was Mr. M. O. Jackson, an apprentice at the G.E.C.'s Witton works, and it is hoped that he will be able to visit France to broaden his knowledge of electric traction.

U.S. Instrument Conference at Cleveland

PRELIMINARY programme of America's seventh National Instrument Conference and Exhibition to be held in the Public Auditorium at Cleveland, Ohio, has just been issued. The conference will take place between September 8 and 12. Some 250,000 invitations have been despatched and the organisers anticipate an attendance of over 10,000. Speakers are to include more than 100 scientists and technical specialists from government, educational and industrial organisations.

Judging from the long list of papers to be presented over the five days, it is to be wondered whether any time can be spared to view the exhibition. There will be a total of 266 displays, of which 166 stands will be those of commercial undertakings.

The sponsors are the Instrument Society of America who are at 1319 Allegheny Ave., Pittsburgh 33, Pennsylvania, but the gathering will include the American I.E.E. Institute, of Physics, Society of Mechanical Engineers, and Institute of Radio Engineers. There will also be numerous social functions both for delegates and their ladies.

AIR-COOLED CHOKES

DUE to a printer's error, a misleading statement occurred in Mr. W. A. Stickley's article on Air Cooled Chokes in our issue of July 10th. The second paragraph under the heading "General Description" should begin with the sentence, "Varnished chokes are made in brick section (80W) or slim section (40W)."

All-Electric Kitchen at University

THE kitchen and refectory in the reconstructed Keele Hall, which caters for students and staff at the N. Staffs University College is now in operation. The kitchen is all-electric and was designed and equipped by the G.E.C. The apparatus installed ranges from four 4·8 kW roasting ovens to a double-deck pastry oven of 7 kW per deck. Other equipment comprises two 18 kW double-pan fish fryers, two 12·4 kW boiling tables, two 8 kW grillers, two 3·7 kW (16-gall) stockpots, two 9 kW steaming ovens, three 12 kW (20-gall) vegetable boilers and two 6·8 kW hot cupboards. Sub-contractors for ancillary equipment included Stotts of Oldham, who supplied tea and coffee units. Electrical specification was prepared by the Midlands Electricity Board.

STAFFING PROBLEM AT BARKING "C"

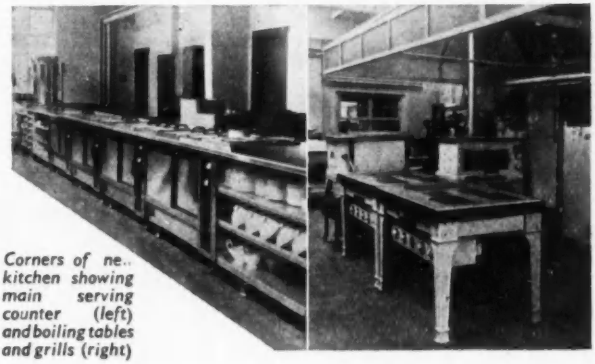
PLANS laid by the B.E.A. for staffing Barking C power station, which is expected to be in operation late this year, are not all plain sailing. It was proposed that about 600 men at present employed in the other two stations should be transferred to the new one to form the nucleus of a new staff. The proposal was based on the fact that, according to the Authority, that number of the 1,800 men at Barking A and B were unnecessary. Union representatives are, however, disputing the transfer, maintaining that there is no redundancy, and insisting that the new station be manned by men not already employed at Barking. Five unions are concerned and two meetings have so far taken place between representatives and the B.E.A. Talks are proceeding.

OVERHEAD LINES RESPONSIBLE FOR TWO DEATHS

TWO inquests were held last week following fatal accidents which involved overhead transmission lines. At Bridgwater a crane came into contact with a cable carrying 33 kV and one worker was electrocuted while others were injured. The men were steadying a load of lorry superstructures on a mobile crane when the accident occurred. Returning a verdict of misadventure, the jury suggested that conspicuous warnings should be attached to cranes and unloading operations banned in the vicinity of overhead cables.

A jury at Dyffryn, Merioneth, returning a verdict of accidental death on a man electrocuted while painting nuts and bolts on a pole carrying 230 V distribution lines, added a rider to the effect that men so engaged should be on the ground and the ladder removed before current was reconnected. With higher voltage lines such a rule is in force, but not in respect of medium voltage lines.

The dead man's colleague told the jury that he waited until work was finished, climbed down his own ladder and gave the signal to reconnect. The explanation appeared to be that when the deceased had got down the ladder, he might have seen a part which had been missed, and returned to paint it.



Corners of ne.. kitchen showing main serving counter (left) and boiling tables and grills (right)

NEWS IN BRIEF

Educational facilities available for training employees in the building industry for managerial and supervisory posts form the contents of a report presented to the Minister of Works by the Building Apprenticeship and Training Council. It is available from H.M.S.O., price 6d.

Proceedings of the twelfth session of the International Commission on Illumination, held in Stockholm last year, have now been published. They may be had from Mr. L. H. McDermott, hon. sec. of National Physical Laboratory, Teddington, Middx. Volumes 1 and 2 are £2 each and Volume 3 is 17s. 6d.

Merseyside and N. Wales Area Final for the E.I.B.A. Golf Competition will be played at Heswall Golf Links on August 26.

Competing for 25 trophies against neighbouring works, in an inter-factory sports meeting, Hoover, Ltd.'s, Merthyr Tydfil group carried off 18 of the trophies.

H.M.V.'s Coronation Display Contest

AMONG the first to announce plans for a Coronation window display competition is the Gramophone Co., Ltd., better known perhaps as "His Master's Voice." The competition will be open to dealers throughout Gt. Britain and numerous prizes are being offered. Material assistance in the form of attractive display features will be made available to competitors by the advertising division of E.M.I. Sales and Service, Ltd.

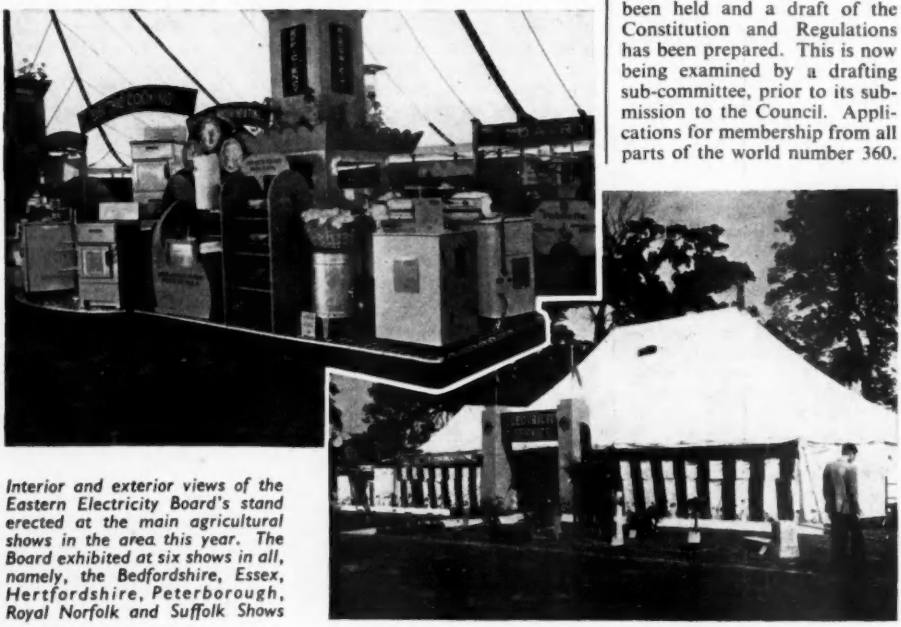
JOINTERS' ALLOWANCE

OUR attention has been drawn to the ambiguity contained in our heading "3s. Rise for Jointers" on p. 165 of last week's issue. As stated in the text the Joint Industrial Council of the Cable Making Industry has approved the award of an increase in allowance to 3s. a day to plumber jointers and mates employed in oil bays.

This new showcard in nine colours is the latest to be made available to Exide car battery dealers. The name display stands proud of the background and with a strong strut forms a firm base. Overall measurement is 26 in. by 21¼ in.

Institute of Materials Handling takes shape

IT is anticipated that an inaugural meeting of the Institute of Materials Handling will be called during October next. Since the announcement some three months ago telling of plans being laid for such an institute, two meetings of the Provisional Council of Management have been held and a draft of the Constitution and Regulations has been prepared. This is now being examined by a drafting sub-committee, prior to its submission to the Council. Applications for membership from all parts of the world number 360.



Interior and exterior views of the Eastern Electricity Board's stand erected at the main agricultural shows in the area this year. The Board exhibited at six shows in all, namely, the Bedfordshire, Essex, Hertfordshire, Peterborough, Royal Norfolk and Suffolk Shows

Questions in Parliament . . .

Fuel and Power Research

The Minister of Fuel and Power informed the House last week of the duties of the Chief Scientists Division. The Division was concerned, he said, with promoting research and development in the efficient use of fuel and power. It consisted mainly of three sections. Firstly, there was a scientific branch which investigated new methods of using conventional fuels and new sources of energy; secondly, a fuel efficiency branch which promoted the application of existing technical knowledge with the object of saving fuel, and finally a separate establishment responsible for research designed to improve the safety, health and welfare of men working in coal mines.

Industrial Tariffs

What were described as disproportionately high charges made for electricity for industrial purposes on Merseyside were the subject of a question by Mr. K. Thompson last week. He alleged that they were having a deterrent effect on new industries considering establishing themselves in the Merseyside Development Area, and asked if the B.E.A. were to be consulted as to a reduction. The questions were addressed to the President of the Board of Trade, who in his reply said he understood a complaint of that nature had been made to the Minister of Fuel and Power. He reminded the House that the Electricity Act provided machinery for dealing with such complaints. He said he knew of no case where the charges had deterred industrialists.

The Monopolies Commission

The opportunity was taken on a Supply Day last week to discuss in a general way the work of the Monopolies Commission. Mr. Hugh Dalton opened the six-hour debate requesting an up-to-date report on activities, information on intended action, what experience had been gained and what was being done about the proposed strengthening and ordering of the Commission's work. He remarked that British trade and industry today was honeycombed with monopolistic and restrictive practices which lead to higher prices, large profits and inefficiency in industry.

Mr. P. Thorneycroft spoke of the importance of the Commission's work, saying it was not so much that the reports made an immediate impact on our economic position but rather that they were essential to our interests and would eventually affect the whole pattern of our economic life. He said he had a prejudice against monopoly, that competition was good, and that in the main we suffered from too little competition. The apparently unconnected industries had been chosen deliberately to get a general picture of the problems to be faced. Of the lamp industry, he said in broad principle the industry had amended its rules to take account of the report and the Government's decision.

Mr. F. Tomney spent a deal of time on the lamp report and thought it set a pattern on which others could well be based. He mentioned a suggestion that the five ELMA controlled firms could possibly be bought by the Government as an agency which would provide competition. The Government could offer more serious competition if they manufactured their own lamps for services they operated directly. The B.E.A. used thousands of lamps, so why should they not produce their own? he asked. The difficulty of starting from scratch and recruiting technical staff could be overcome, he thought, to which Mr. C. Poole retorted that it would involve heavy capital expenditure before the Government could produce one lamp.

The opinion that the lamp industry, as indeed all investigated so far, was highly efficient, was expressed by Mr. W. Shepherd, who also urged an inquiry into State monopolies. Mr. B. Nield pointed out that before an industry could be referred to the Commission it had to be shown that at least a third of goods made were supplied by one organisation. In each case there was still plenty of competition. The industries were not the sole vendors, had no exclusive rights, and were not even required to have a majority. Another question was whether trades had a right to associate when they dealt possibly with buyers or suppliers who themselves had an exclusive right. He said he was thinking of the B.E.A. Mr. Nield maintained there were probably no monopolies in British industry except State monopolies.

Stockholm Conference

Explaining the work of the Stockholm Conference on Broadcasting, Mr. D. Gammans said the British delegates agreed to frequencies allotted to us in Band 1, which included high and low powered TV stations. In Bands 2 and 3, a large number of frequencies were allocated to us, but it was essential to reserve freedom until plans for developing v.h.f. sound and TV broadcasting had been decided.

Fuel Economy Report

The Minister of Fuel and Power stated on Monday that he had received the report of the Ridley Committee on National Fuel Policy. It would be presented to Parliament as a Command Paper and should be available in about six weeks' time.

P.T. Committees

The Chancellor of the Exchequer made a statement last week concerning the formation of committees to consider the question of treatment of taxed stocks on a reduction of purchase tax and of valuation of goods for p.t. purposes. He said those committees had been set up and would be under the respective chairmanships of Sir Maurice Hutton and Mr. Frederick Grant. It was hoped that both bodies would be able to start work soon.

Electric Supply News . . .

Eastern Board

Formal public notice has been given by the Eastern Electricity Board to the effect that it is proposed to carry out the changeover of consumers' supplies to the standard a.c. 240/480/415V in certain parts of Cambridgeshire, Norfolk and Suffolk within the next six months.

Eire

The Electricity Supply Board has officially taken over from local concerns supplying electricity in Ardara and Glenties (Co. Donegal). Some time ago the interests of two concerns, the Ardara Woollen and Industrial Company and Glenties Electricity Supply Co., Ltd., were also acquired by the Board.

Isle of Man

The diesel-engine power station at Peel, of the Isle of Man Electricity Board, now with an output of 6,000 kW, is to have its capacity raised to nearly 11,000 kW by the installation of two more Mirrlees diesel-alternators. It is expected that these two new sets will be installed later this year. Domestic consumption on the island in the area of the board has shown a steady increase in the post-war years, and the electrification of more than 300 farms in the last three years has greatly added to the load.

Liverpool

A new charge imposed by the Merseyside and North Wales Electricity Board on Liverpool Corporation Lighting Committee for service for the installation of service lines to public street lamps will seriously retard the committee's plans to convert gas lighting into electric lighting, it is reported. It is stated that the new charge means that to convert the existing 12,000 gas lamps into electric lighting would cost about £120,000, and Alderman A. Critchley, chairman of the Lighting Committee, says the whole policy of electrification will have to be reviewed. It was reported that the new cost would include about £2,500 a year to the Housing Department for services on new estates, and to the City Lighting Department about £84,000. The total increased cost to the Corporation would be approximately £2,675 a year. A special report considered by the committee stated that the average price per unit to the Corporation was 1.08d., so that the increase of £2,675 a year could be covered by a tariff of 1.152d. per unit on the present estimated consumption of nine million units a year. The Board had intimated that if it should be agreed they had no statutory right to make a charge for service lines and the Corporation wished the matter to be dealt with on a statutory basis, it would be on the understanding that the statutory tariff of 4½d. per unit was charged for all electrical energy used for street lighting. If that were made effective it would involve the Lighting Committee in an additional expenditure of £128,000 a year. The new charge of £10 per service line will operate from September 1.

Newark

The Rural District Council has decided not to object to the B.E.A.'s proposal to erect an overhead transmission line across land in its area. The line will run from Staythorpe power station to Elstree, Middx. A letter from B.E.A. asked for the Council's views and pointed out that formal planning authority would be sought later. The chairman, Mr. M. C. Horner, said there were already lines over that part of the district where the new one was proposed. This was "just another one."

Northumberland

The route of the B.E.A.'s proposed 275 kV grid line from Stella to Carlisle, is by no means settled, it seems. The Minister of Fuel and Power has admitted that local landowners and tenants, if they refuse to grant wayleaves to the B.E.A., may force him to revise to some extent the route of the line. The admission is made in a letter from Mr. Geoffrey Lloyd to Hexham's M.P., Mr. R. Speir, who has been pressing the Minister, on behalf of various local authorities and organisations, to revise his decision at least so far as the line in the vicinity of Newbrough and Fourstones villages is concerned. Some 90% of the farm owners and tenants affected by the proposed line in the South Tyne district have stated they intend to refuse wayleaves. The Minister has stressed that if the B.E.A. had to apply to him for compulsory wayleaves, the objections of local owners or occupiers would have to be heard, and it was possible that special considerations might compel him to approve some minor alterations to the route. But, he emphasised, the question of making major alterations on general principles could not now be re-opened.

LIGHTING SCHEMES

Goole.—T.C. has received Ministry approval to a scheme to erect 55 more electric standards on the Western Road housing estate, at a cost of £1,930.

Hinckley.—U.D.C. seeking loan sanction for £4,692, being its share of the cost (£9,384) for installing new lighting on trunk roads in the district.

Newtown and Llanllwchaiarn.—The U.D.C. has approved a scheme for extension of street lighting, to cost £4,145.

Potters Bar.—U.D.C. has approved a scheme for sodium lighting along part of the Great North Road at a cost of £3,225.

Retford.—T.C. is to prepare a scheme for the conversion of 50 street lamps from gas to electricity.

Company Activities . . .

Ada (Halifax) Ltd.

A five-storey factory in Miall Street has been acquired, to which has been transferred the production of washing machines (and which is capable of turning out four times the present output), while the original Johnson Street factory has been turned over to machine-tool production and high priority aircraft components, stated Lt.-Colonel W. D. Gibbs, chairman, at the meeting last Thursday. The company's export trade in washing machines had been curtailed by 70%, he revealed, when also announcing that it was proposed to introduce a new and lower-priced machine within the next few months.

Aron Electricity Meter, Ltd.

For the year ended March 31 last, the profit is £96,679 (*£86,523*) before charging taxation of £62,396 (*£49,510*). The dividend is again 15%. There is £15,000 (*same*) placed to general reserve and £47,728 (*£34,811*) carried forward.

Britannia Electric Lamp Works

The group profit for the year to March 31 last is £38,745 (*£50,356*), after charging taxation of £64,873 (*£60,917*). The dividend is again 12½%.

Broadcast Relay Service

Application has been made to the Capital Issues Committee for permission to issue new capital amounting to some £2½ million in debenture stock and Ordinary shares.

E. K. Cole, Ltd.

An increase in the borrowing powers from £750,000 to a maximum of £1,250,000 was approved at an extraordinary general meeting last Thursday. Previously, Mr. E. K. Cole, chairman and managing director, had outlined the continued expansion of the concern. On the radio side they had taken full advantage of the good trading conditions, and despite increased wages and higher prices for raw materials they were able to avoid putting up selling prices, although the profit margin was reduced. The volume of home television production had enabled them to quote competitive prices in Canada and South America, with the result that they were already in production on one order for television receivers worth over $1,500,000 and awaited final confirmation of another amounting to over $650,000. In spite of difficult conditions, the Plastics Division had increased its turnover and operated profitably, but the Heating Division was still subject to licensing restrictions and a high rate of purchase tax which retarded expansion.

General Electric Co.

The group aggregate profit for the year to March 31 last, before taxation and minority interest, amounted to £6,603,957, an increase of £952,539 over the total for the previous year. The final Ordinary dividend is 7½% on increased capital, again making 15% for the year. The total distribution thus absorbs £628,181, compared with £495,933 for the preceding period. Taxation charged, including E.P.L. of £200,098 (*nil*), is £3,785,914 (*£3,149,743*), and the group net profit attributable to the holding company is £2,091,114 (*£1,978,039*).

George Kent Ltd.

After charging taxation of £103,906 and crediting tax over-provision of previous years amounting to £30,000, the parent company's profit is £122,944 (*£144,134*). The final Ordinary dividend is 9½% again, making 12½% for the year.

Morgan Crucible Co.

The group profit for the year to March 31, after all charges, but before taxation, is £1,966,918 (*£1,516,976*). U.K. taxation absorbs £1,014,889 (*£821,918*), and foreign taxation £86,271 (*£81,038*). The final dividend is 8¾%, making 12½%.

Oldham and Son

The preliminary statement shows a net profit, before taxation, of £319,706, for the year to March 31 last, as against £270,176 for the previous 12 months. The final dividend is raised by 5% to 20%, making the year's total distribution 35% (*30%*). Taxation absorbs £187,362 (*£157,007*) and £100,000 (*£65,000*) goes to general reserve.

Revo Electric Co.

The full accounts show group current assets listed at £1,621,863 (*£1,320,244*), of which stocks account for £926,310 (*£733,959*). The directors state that the latter rise reflects increased values and activity, but nevertheless, in view of the changing conditions, steps have been taken to reduce the stock. Current liabilities and provisions amount to £500,779 (*£365,053*). A steady improvement in production has been maintained throughout the year, due to the modernisation of the plant and layout, states Mr. W. L. Burrows, chairman. A long-term plan is in being to further this modernisation, but owing to changed conditions this may take longer to complete than was originally anticipated, he adds.

Telegraph Construction and Maint. Co.

It is announced that acceptances were received for over 96% of the rights offered to shareholders in the recent issue of 651,364 Ordinary £1 shares at 21s. 6d. each. The balance has been taken up by the underwriters.

Dividends Declared

Mather and Platt Ltd.—Interim of 4% (*same*).

Electric Furnace Co.—Final dividend 5½% making 10% (*both same*).

Negretti and Zambra.—Interim of 5% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Aug. 1.—Belfast. Supply and erection of (*a*) three-phase l.v. high rupturing capacity switchgear, and (*b*) carbon dioxide fire extinguishing equipments for substations. Electricity Dept., E. Bridge St. (See July 10 issue.)

Aug. 1.—Belfast. Supply of (*a*) 3-phase l.t. oil-immersed circuit-breaker (Spec. No. G.174a), and (*b*) portable electric hoist (Spec. No. G.178). Electricity Dept., E. Bridge St. (See July 10 issue.)

Aug 1.—Durham. Electrical installation in High Usworth, and Peterlee infants' schools. Applications by above date to G. R. Clayton, County Architect, Court Lane.

Aug. 1.—Troon T.C. Electrical work in erection of 38 houses—first stage in third development of Barassie scheme. Applications by above date to Housing Director, Municipal Buildings.

Aug. 5.—Dublin. Electrical installations at Dublin Regional Sanatorium, Blanchardstown, being built. Documents from P. D. Cinneide, Dept. of Health, Custom House. Deposit £20.

Aug. 5.—Keynsham U.D.C. Electrical installation in 48 houses on Park Rd. estate. Engineer and Surveyor, Council Offices, Keynsham, Bristol. Deposit £2 2s.

Aug. 6.—Hull. Electrical installation at Newland school. A. Rankine, city architect, Guildhall. Deposit £1 1s.

Aug. 7.—Belfast. Electrical installation of assembly hall, servery, etc., at Mount Vernon Special School. Education Architect, 49 Academy St.

Aug. 7.—Co. Down. Electrical installation at Ballynahinch Primary School. Documents from J. R. W. Murland, 13 Wellington Place, Belfast. Deposit £5 5s.

Aug. 7.—Strabane R.D.C. One electric sludge pump and equipment for Sion Mills sewerage scheme. Consulting Engineers, Croasdaile and Taggart, 36-38 Castle Arcade Bldgs., Belfast.

Aug. 8.—Bury T.C. Supply and erection of Enfield suspension lighting systems in Transport Depot, George St., and in the Rochdale Rd. garage. Borough Engineer, Town Hall, Deposit £2 2s.

Aug. 8.—Coleraine. Electrical works at Coleraine Hospital for N. Ireland Hospitals Authority. Documents from W. and M. Given, architects and engineers, 1 Waterside. Deposit £2 2s.

Aug. 8.—Stepney B.C. Installation of power and lighting points in 124 dwellings in Cornwall St. area. Borough Engineer and Surveyor, Municipal Offices, 227-33 Commercial Rd., E.1. Deposit £5. (See July 17 issue.)

Aug. 8.—Waterford. Public Assistance Board invites tenders for installation of internal communication in County Hospital, Waterford, County Home and District Hospital, Dungarvan, and the Fever Hospital, Waterford, Edward R. Ryan, Consulting Engineer, 1 Montpellier Ter., Galway. Deposit £5 5s.

Aug. 8.—West Kesteven R.D.C. Electrical installation in five houses at Great Gonerby. J. Dean, surveyor, Council Offices, 19 Watergate, Grantham.

Aug. 9. — Ince-in-Makerfield U.D.C. Electrical installation in erection of 60 houses on Bettersby St. site. Surveyor, R. Lewis. Town Hall, Deposit £1 1s.

Aug. 9.—Leeds. Electrical installation in erection of admission hospital and hostels at Stanley Royd Hospital, Wakefield, for Regional Hospital Board. Applications by above date to Board's secretary, Wm. A. Snee, Park Parade, Harrogate.

Aug. 9.—Peterborough. Lighting and power installations in 50 houses on Dogsthorpe estate. Applications by above date to F. J. Smith, City Engineer and Surveyor, Town Hall. Deposit £2 2s. (Advertised in this issue.)

Aug. 9.—Worsley U.D.C. Electric wiring for power and light in 81 dwellings on Hill Top site, 274 dwellings on Mount Skip site and 28 on Boothstown site. Also supply of electric washboilers and cookers for same. These are separate contracts. H. Lomax, Clerk to Council, Town Hall, Walkden, Manchester.

Aug. 11.—Elland U.D.C. Electrical work in 14 houses in Thomas St. Engineer and Surveyor, Council Offices. Deposit £2 2s.

Aug. 11.—Kidsgrove U.D.C. Electrical installation in 128 houses and six bungalows in Lower Ash scheme. Architect, Town Hall. Deposit £2 2s.

Aug. 11.—Leeds. Supply of 60 side- and one top-entry totally enclosed 140 W sodium lanterns with control gear. Town Clerk, Room 57, Civic Hall. (See July 24 issue.)

Aug. 15.—Cookstown. Complete electrical installation at fire station being built in Chapel St. H. B. Reid, secretary to N. Ireland Fire Authority, Castle St., Lisburn. Deposit £2 2s.

Aug. 16.—Ceiriog (Denbigh) R.D.C. Electrical installation in (*a*) six houses at Penybont, and (*b*) four at Pandy, R. W. Aubrey, surveyor, The Mount, Chirk. Deposit £1 1s.

Aug. 16.—Selkirk. Electrical work in erection of 18 houses on Bannerfield site. Town Clerk, Municipal Buildings.

Aug. 16.—Selkirk T.C. Electrical work in erection of two blocks of (18) houses on Bannerfield site. Office of Town Clerk, Municipal Buildings.

Aug. 18.—Manchester. Electrical installation at "Ellerslie," Suffolk Rd., Bowdon, Cheshire. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

Aug. 18.—Washington U.D.C. Electrical work in erection of 46 houses in Oxford Ave. Surveyor, Council Chambers.

Aug. 23.—Stroud (Glos.) R.D.C. Wiring in houses in Tetbury St., Minchinhampton. Housing Manager, Council Offices.

Sept. 3.—Greenwich B.C. Tenders invited for electric street lighting schemes under Contract No. 1: removal of 367 h.p. gas columns and adaptation and re-erection of 233 columns, and adaptation *in situ* of 141 columns; and under Contract No. 2: provision of bracket arms, lanterns, control gear and wiring to 374 columns and 2 suspended lanterns. Borough

Engineer and Surveyor, Town Hall, S.E.10. Deposit £2 2s. (See July 24 issue.)

Sept. 8.—Musselburgh. Erection of 15 lamp standards and installation of sodium lamps in Pinkie Rd. Burgh Surveyor, Municipal Offices, High Street.

Sept. 12.—Kendal T.C. Provision and installation of 72 mercury vapour lighting units and 7 fluorescent units, in Group A, including concrete columns and auxiliary equipment, and wiring along Windermere Rd. Borough Engineer and Surveyor, Municipal Offices, Lowther Street. (See July 24 issue.)

No date stated.—Midlothian. Electrical work in erection of 12 houses at Stowe. Documents from County Architect, 32 Palmerston Place, Edinburgh.

OVERSEAS

Details of items marked may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

Aug. 18.—New Zealand. Supply of 1,750 yd single-core paper-insulated cable for Auckland Electric Power Board, Queen St., Auckland. B.o.T. (Ref. CRE 25395/52).*

Aug. 18.—New Zealand. Supply of 6,000 yd of electric cable for Auckland Electric Power Board, Queen St. It should be of standard high conductivity electrolytic copper, lead alloy sheathed, double steel tape armoured suitable for l.t. 3-phase 50 c-s system. B.o.T. (Ref. CRE 25268/52).*

Aug. 21.—Greece. Supply and installation of one electrical generating set comprising a diesel engine of 60 to 65 h.p. and a generator, 3-phase 220/380 V, for State Procurement Service. B.o.T. (Ref. CRE 26037/52).*

Aug. 22.—Formosa. Tenders invited for supply of cables, gasoline engine generator and switchboard set, runway lights, cut-outs, switches, etc. Central Trust of China, 68 Yen Ping Rd., South Taipei, Taiwan. B.o.T. (Ref. CRE 25267/52).*

Aug. 27.—Uruguay. Supply of accumulator batteries for use with central telephonic equipment for Usinas Electricas y Telefonos del Estado. B.o.T. (Ref. CRE 25865/52).*

Aug. 29.—India, Bombay Electric Supply and Transport Undertaking invites tenders for supply of 8,000 kVA, 22,000, 6,500 V 3-phase, 50 c/s transformer, with automatic on load voltage regulating gear, and accessories. The Undertaking is at Electric House, Fort Bombay 1. B.o.T. (Ref. CRE 24787/52).*

Sept. 2.—Australia. Manufacture, supply, installation and testing of electrically driven centrifugal pumping plant comprising three pumping units, control equipment, cables, pipes, etc. Commissioner for Irrigation and Water Supply, William and Margaret Sts., Brisbane.

Sept. 2.—Uruguay. Tenders invited by Usinas Electricas y Telefonos del Estado for supply of 80,550 metres of lead-covered conductors to be used under normal tension of 220 V. B.o.T. (Ref. CRE 24852/52).*

Sept. 6.—Syria. Supply of considerable quantities of various telephone and telegraph cable and equipment for Directorate General, Posts, Telegraphs and Telephones, Damascus. B.o.T. (Ref. CRE 25246/52).*

Sept. 9.—South Africa. Supply and erection of circulating water pumps and pump-house equipment, and supply of circulating water valves for Bloemfontein's new power station. Consulting Engineers, Merz and McLellan (South Africa), 1419 Escom House, Rissik St., Johannesburg. Deposit £2 2s.

Sept. 11.—South Africa. Supply and erection of eight centrifugal water pumps with drive, electric motors, starters, valves and accessories for Municipality of Douglas. Tenders also invited for supply and erection of filtration plant for treating crude river water at rate of 8,000 g.p.m., with filters, dosing plant, electrical equipment, pumps, air compressors and accessories. Town Clerk, Douglas. Deposit £2 2s.

Sept. 11.—South Africa. Municipality of Reitz requires supply and erection of plant and equipment to convert existing d.c. system to 11 kV a.c. system. Contract No. RTS/HEP/52 includes switchgear and control equipment, transformers, replacement of d.c. appliances, etc. Town Clerk, P.O. Box 26, Reitz. Deposit £5 5s.

Nov. 4.—New Zealand. State H. E. Dept. invites tenders for manufacture and supply of 350 MVA 11 kV switchgear of duplicate busbar indoor metal-clad drawout type and accessories for New Plymouth substation. Copies of documents will be at N.Z. Government Offices in London.

Nov. 4.—New Zealand. Supply of eight 110 kV three pole 1,000 A, and six 110 kV three pole 600 A air break switches, and three 110 kV three pole same with earthing switches; also set of spares, all for Roxburgh power station. Tenders to Secretary of Tenders Committee, State H.E. Dept., Wellington. Documents from N.Z. Government Offices in London.

Your Queries — Answered

"Latralok" fusegear, makers of? A.C.—Carlisle Electrical Mfg. Co., Ltd., Bentcliffe Works, Salters Lane, Eccles, Lancs. (23487)

Sample dryers for textiles, makers of? F.H. — Try: Bestfrend Electrical Co., Ltd., Diceland Works, Banstead, Surrey. (23494)

"Junction" irons, makers of? S.W.—G. P. Chamberlain and Co., Ltd., Junction Works, Carmichael Rd., S.E.25. (23506)

"Segic" motors, makers of? J.P.—Mortimer Eng. Co., 37 Soho Sq., London W.1. (23514)

Book marking stylus, makers of? S.B.—Woolston Book Co., Ltd., Byard Lane, Nottingham. (23521)

"Rogers Vitalator" medical apparatus, makers of? T.E. —Ideal Home Electrical Appliances Ltd., 45 Gt. Ormond St., W.C.1. (23528)

"Lancastrian" switchgear, makers of? W.L.—Dorman and Smith Ltd., Ordsal Electrical Works, Salford, Manchester. (23532)

"Castra" washing machines, makers of? B.C.—Castra Electric Washing Machine Co., Ltd., Canal Works, Rodley, Leeds. (23539)

The above are selected from questions we have answered this week. If you have a query, send it to us.

CONTRACTS PLACED

Attleborough (Norf.). Electrical installation at Wayland Hospital, Norwich Electrical Co., Ltd., £1,712.

Battersea B.C. Electrical installation in housing scheme in Battersea Park Rd., Iverson Electrical, Ltd., £1,234.

Battersea B.C. Supply of 14 fluted steel lamp columns with brackets, 16 steel lamp brackets, and 39 mercury lanterns, G.E.C. £1,082; supply of fluorescent fittings for Central Library, Thorn Electrical Industries, Ltd., £629.

Coventry. Electrical work in Central College of Art and Technology, F. L. Flinn, £6,167.

Eccles T.C. Electrical work in 90 houses and 12 flats on Ellesmere Park Estate, L. Knowles, £2,877.

Elgin T.C. Installation of street lighting in housing schemes in Lossiemouth Rd. and at Seafield Lands, Lawson and Proctor, £1,681.

Grimsby T.C. Electrical installation in 182 houses on Little Coates Estate, £5,874, and 43 houses on Carr Lane Estate, £1,395, Hobson and Scott, Ltd.

Hull. Electrical installation in 114 houses on Bilton Grange estate, Reliance Electrical Co.; and same in 97 dwellings on same estate, J. Todd.

London. Electrical installation in George Lansbury school, L.S.P. Electrical Co.; in Heber school, Honor Bros., Ltd.; in Canterbury Rd. school, W. M. Grant and Co.; in Virginia school, Norwest Services, Ltd.; and in Christopher Halton school, Holmes and Larkinson.

Also overhaul and installation of generating sets on sludge vessels. R. and H. Green and Silley Weir, Ltd.

Morpeth T.C. Installation of lighting and power in 422 houses. Mood and Sons, £5,190.

Poplar B.C. Electrical work in erection of blocks of flats in Abbott Rd. area, Iverson Electrical, Ltd., £7,082.

South Shields T.C. Electrical installation in additions to boys' grammar/technical school, Watson-Norie Ltd., £8,345.

West Hartlepool T.C. Supply of street lighting columns and brackets, Engineering and Lighting Equipment Co., Ltd.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	287 0 0	—
LEAD, good soft pig (foreign)	131 0 0	£128 0 0
" "English" quality	132 10 0	
TIN (99-99.76%) (Cash)	967½-968	—
" (3 months)	966½-967	—
ALUMINIUM, commercial purity (del.)	157 0 0	—
ZINC	130 0 0	120 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	55 0 0	—
Mild Steel Tape (0.04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Arpan Engineering Co., Ltd. Resolution passed at meeting on July 15 for voluntary winding-up when David Morgan, 100 Park St., W.1, was appointed liquidator.

Central London Electricity Accessories, Ltd. At meeting on July 23, resolution passed for voluntary winding-up. H. J. Mellows, 46-47 New Broad St., E.C.2, was appointed liquidator.

Electrical and Radio Engineers (Golders Green), Ltd. Meetings of creditors and contributories will take place tomorrow (Fri) at Inveresk House, (Room 401), 346 Strand, W.C.2, at 10.15 a.m. and 10.45 a.m. respectively.

Horace Dibben, Ltd. Resolution for voluntary winding-up passed at meeting on July 14 when N. W. Osborne, C.A., of 11-12 Finsbury Sq., E.C.2, was appointed liquidator.

Krivert Ltd. Notice has been given that a meeting of members will be held at 33 Sussex Place, W.2, on August 22, at 10.30 a.m. to receive liquidators' report.

Strong Illuminating Engineering Co., Ltd. Meeting of members is to take place at Hackbridge Mills, Hackbridge, Surrey, on August 22, at 5.30 p.m., to receive liquidators' report.

Sunbeam Domestic Appliances, Ltd. Creditors are asked to send particulars to A. K. Lee of Holly Lodge, Brighton Rd., Nr. Kingswood, Surrey, liquidator, by August 23. Notice has also been given that a meeting of members will take place at 4 Gower St., W.C.1, on August 25, at 11 a.m. to receive liquidators' report.

BANKRUPTCY ACTS

First Meeting

Middlesbrough. John G. Milne, electrical dealer trading at 34 Whitworth Rd., Grangetown. Meeting will be at Official Receiver's Office, 4 Bridge Rd., Stockton-on-Tees, on Aug. 8 at 11 a.m., and public examination at the Court House, Wilson St., West, Middlesbrough, on Oct. 6 at 10.30 a.m.

Release of Trustees

London. Royal E. Stebbings, trading as Millman Refrigeration Service, at 87 Guildford St., W.C.1. Trustee was F. H. Langmaid, Official Receiver, Bankruptcy Buildings, Carey St., W.C.2.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller

Concathene. 707,578. Class 9. Aerials, wires and cables, and electricity conductors. Concordia Electric Wire and Cable Co., Trent Mills, Derwent St., Long Eaton, nr. Nottingham.

Diadem. 706,269. Class 9. Radio sets, radiogramophones, and gramophones. Bush and St. Clair, Ltd., 341a, High Rd., Wood Green, N.22.

F.L.S. 689,474. Class 7. Grinding mills; crushing and agitating machines; separating apparatus; valves; pumps and fans. 689,475. Class 9. Instruments for use in indicating and centrally controlling the operation of industrial plant for the processing and treatment of minerals, ores, etc., 689,476. Class 11. Heated rotary kilns, etc. F. L. Smidth and Co., Ltd., 105 Piccadilly, W.1.

Histal. 707,102. Class 9. Electrical resistances. Radio Resistor Co. Ltd., 50 Abbey Gardens, N.W.8.

Involine. 707,418. Class 6. Tension clamps for overhead cables. Bullers Ltd., Leek Rd., Milton, Stoke-on-Trent.

BUSINESS PROSPECTS

HOME

Altrincham T.C. Application to be made for sanction to borrow £113,715 for erection of 88 houses on Broomwood estate.

Ashford (Kent). Approval sought to plans for £55,000 Beaver Green primary school.

Ayrshire. Approval granted for nursery school at Wallacetown public school and for erection of R.C. primary school at Dalmilling.

Berkshire. Erection of primary school at Bracknell. County Architect, Wilton House, Parkside Rd., Reading.

Bicester U.D.C. Erection of 26 houses on Bucknell Rd. site. H. W. Smith and Son, architects, 29 George St., Oxford.

Billericay U.D.C. Twenty-four houses to be built at Wickford and 32 at Laindon for old persons.

Bowland (Yorks) R.D.C. Thirty-four houses to be built at West Bradford and 26 at Grindleton.

Brigg R.D.C. Prices to be obtained for provision of power points on the landings of 150 council houses, where electricity was installed recently.

Brighton T.C. Erection of six shops with flats in College Place and St. George's Rd.; transfer of Rottingdean junior school to The Grange; Town Clerk. Also, factory to be built in Moulsecombe Way for New Welbeck, Ltd., and R. J. Adcock and Co., Ltd.

Caistor R.D.C. It is proposed to build block of council flats.

Cardiff. It is proposed to build block of six shops and flats in Llangranog Rd., and block of four shops and flats in Fishguard Rd.

Carlisle. Construction of new junior school at Harraby. L. J. A. Stow, City Engineer, 18 Fisher Street.

Chesterfield T.C. Junior School is to be built at Newbold at estimated cost of £48,425.

Chorley T.C. Permission sought to borrow £39,746 for erection of 32 houses on Weldbank Lane site.

Clogher (Tyrone) R.D.C. Construction of 36 houses at Ballygawley, 34 at Fivemiletown, 19 at Aughnacloy, and 22 at Mullaghtinney. M'Carthy and Lilburn, quantity surveyors, Donegal Sq. West, Belfast.

Denton U.D.C. Erection of 28 houses on Haughton Hall No. 2 site. Engineer and Surveyor, Town Hall.

Devonshire. It is proposed to build a secondary school costing some £93,500, at Uffculme.

East Kilbride. Plans approved for erection of bacon curing actory at Calderwood Glen for J. and W. Galloway, Ltd.

Enfield U.D.C. Erection of 36 dwellings in Lyndhurst Gdns. Frank Lee, engineer and surveyor, 7 Little Park Gardens.

Fifeshire. High schools costing £500,000 are to be built at Kirkcaldy and Buckhaven.

Glastonbury T.C. Erection of 28 houses on Windmill Hill estate. H. N. Alves, surveyor, 66 High St.

Golborne U.D.C. Construction of 28 houses at Glazebury. Engineer and Surveyor, J. B. Hoyle, Council Offices, Lowton, nr. Warrington.

Harold Hill (Essex). Major shopping centre to be provided on Harold Hill estate comprising some 87 shops, 67 flats and 45 maisonettes and post office. Estimated cost £663,000.

Heywood. W. Rhodes, Ltd., to build light engineering works in Schofield Rd.

Hucknall (Notts) U.D.C. Erection of 76 houses on Ruffs Farm estate. Surveyor's Dept., Council Offices, Watnall Rd.

Ilford T.C. Erection of total of 96 houses, six shops and maisonettes under three contracts on Maypole estate. Borough Engineer and Surveyor Town Hall.

Inverness-shire. It is proposed to build a primary school at Dalneigh.

Johnstone T.C. Construction of 24 houses as extension to Howwood Rd. scheme. R. S. Macrae, Town Hall.

Lowestoft. Plans approved for extensions to factories in Harbour Rd. for Brooke Marine Ltd., and Waveney Works for United Paint Co.

Melksham (Wilts) U.D.C. Erection of 32 houses on Woodrow Park estate. Engineer and Surveyor, Town Hall.

Middlesbrough. Four schools costing £531,736 to be built next year—namely, Middle Beck No. 2 secondary, Berwick Hills No. 2 primary, Town Farm secondary, and Longlands county college.

Midlothian. Plans approved for primary school at Poltonhall.

Newcastle-under-Lyme T.C. Erection of 10 shops, 2 maisonettes and 24 flats in one block on Bradwell Estate. Names to C. J. Morton, Town Clerk.

New Mills (Lancs) T.C. Erection of 13 bungalows on Highfield estate. Council's Surveyor, Town Hall.

Nottingham. Application to be made for sanction to borrow £11,200 for additional accommodation at Queen's Walk junior school.

Ormskirk. St. Anne's R.C. church proposes to erect two schools costing £80,000.

Plymouth. Fullers, Ltd., are to build premises in New George St., estimated to cost £30,000, and Ravenseft Properties a block of five shops costing some £50,000 in same street.

Rochdale T.C. Tenders may be invited soon for shopping centre on Kirkholt estate.

Rotherham. British Oxygen Co. has acquired site at Brinsworth for new oxygen producing plant. Estimated cost £250,000.

Roxburgh. Plans approved for erection of primary school at Burnfoot, estimated to cost £200,000.

Rugby R.D.C. Erection of 40 houses and 4 bungalows at Long Lawford. Council's Surveyor, 24 Warwick St., Rugby.

Saffron Walden (Essex) R.D.C. Plans to be laid for 28 houses at Elsenham, and 24 each at Stansted and Newport.

Scarborough T.C. Loan sanction for £93,461 being sought for 70 houses on Eastfield site, and £32,949 for 25 houses in same estate.

South Shields. Ten houses and 20 bungalows to be built in Marsden Rd.

Spalding R.D.C. New offices and a council chamber have been proposed for site near St. Peter's Hall in Priory Rd.

Stanley U.D.C. Construction of 20 houses at Kirkhamgate. J. Hustwit, Engineer and Surveyor, Council Offices, Coach Rd., Outwood.

Stockton-on-Tees. Junior school

Business Prospects—continued

to be built on Roseworth estate. Borough Architect, T. C. Hartley, 28 The Square.

Thingoe (Suffolk) R.D.C. Thirty-two houses to be built on six sites.

Wakefield. It is proposed to build 32 flats at Gill Sike, 20 at Flanshaw, and 100 houses on New Kettlethorpe estate.

Walsall T.C. Revised plans in hand for junior dept. of Alumwell primary school estimated to cost £60,600.

Wandsworth B.C. Erection of six blocks of flats comprising 144 dwellings in Clapham Rd. R. H. Jerman, town clerk, Municipal Bldgs., S.W.18. Also preliminary plans have been approved for Putney secondary school estimated to cost £426,572.

Wednesbury T.C. Approval sought for an additional 90 houses proposed for Golf Course estate.

West Hartlepool. Next year's building programme is to include Rossmere school, first phase of Brierton secondary school, extension to Dyke House secondary school and repairs at Tunstall Court.

West Hartlepool T.C. Plans approved for erection of 49 bungalows in Creiff Walk and Crail Walk. Borough Architect is A. G. Sinclair.

West Penwith (Corn.) R.D.C. During next three years it is proposed to build 100 houses per year.

Whitley Bay U.D.C. Tenders to be invited soon for erection of flats on Seatonville Neighbourhood Unit. Surveyor is E. Roberts.

Whitley Bay U.D.C. Plans in hand for 28 houses in Albert Rd., Seaton Sluice.

Worcester. Construction on Newtown No. 2 estate of block of six shops and maisonettes. City Engineer and Surveyor, 22 Bridge St.

Woking. A block of 24 shops and 48 flats is to be built on Sheerwater estate at estimated cost of £193,000.

Worthing R.D.C. Fifty houses to be built in Upper Brighton Rd. and Hillrise Ave., Sompting.

TRADE NOTES

Changes of Address. As from August 11, the offices of the Accountant's staff of the London Division of the B.E.A. at Aldwych House, W.C.2, will be transferred to Clifton House, Euston Road, N.W.1. Telephone No.: Euston 2838.

The London Office of the D.P. Battery Co. has been transferred to 66 Victoria St., S.W.1. Tel.: Victoria 9661.

Extension. The General Electric Co., which already has an interest in a production unit at Portsmouth, has been discussing with the Corporation officials for some months past the possibility of extending their light engineering and electronic manufacturing facilities in this area. It is now expected that it will open some new factories within a year or so, and these will take care of high priority work and employ several hundred new employees, skilled and unskilled.

Holiday. The Sales Office and works of Aidas Electric, Ltd. will be closed from August 1 to August 16 inclusive.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Atom Electrics (Northampton) Ltd., 21 Barrack Rd., Northampton. To take over business of electrical engineers and dealers in radio and television apparatus carried on as "Atom Electrics" at Northampton. Cap.: £3,000. Dirs.: A. R. S. Hawkins and Mrs. E. M. Hawkins.

Best and May Ltd., 345 Kennington Rd., S.E.11. Manufacturers of and dealers in electrical and engineering products, wireless and television sets, etc. Cap.: £100. Dirs.: J. T. May and W. Best.

G. Bramall (Tungsten) Ltd., 24 Norfolk Row, Sheffield 1. To undertake the recovery of tungsten; and to carry on business of manufacturers of and dealers in ferro tungsten, tungstic acid, etc. Cap.: £3,000. Dirs.: G. Bramall, L. N. Roe and P. G. Jordan.

C.B.B.C. Electronic Devices Ltd., 26/7 Conduit St., W.1. Cap.: £600. Dirs.: S. J. Birn, C. Calmon, R. J. Barr and L. Chambers.

Cousins and Wright (Manufacturing) Ltd., Norfolk House, Laurence Pountney Hill, E.C.4. Manufacturers of and dealers in cameras, photographic plates, wireless receiving and transmitting sets, etc. Cap.: £1,000. Dirs.: G. A. S. Cousins and C. Wallis.

Crosfield Instruments Ltd., 8 Drapers Gdns., E.C.2. Manufacturers and importers of and dealers in electrical and mechanical machinery and apparatus, etc. Cap.: £1,000. Dirs.: J. F. Crosfield and D. H. Bent.

Neon Ideas Ltd., Laytons Bldgs., 199B Borough High St., S.E.1. Designers, manufacturers of and dealers in neon signs, etc. Cap.: £200. Dirs.: J. F. Aldridge, F. E. Metters and S. G. Ford.

Pinnicks Radio and Television Co. Ltd., 107 Addison Rd., Birmingham 14. Cap.: £1,000. Dirs.: R. Pinnick, Violet M. Pinnick and J. Pinnick.

Redcliffe Industries (Bristol) Ltd., 1 William St., Totterdown, Bristol 3. Manufacturers of and dealers in electronic, radar, atomic, electrical and mechanical apparatus and accessories, etc. Cap.: £5,000. Dirs.: E. W. Hutton and R. G. Hawkins.

S. Rogerson and Co. Ltd., 4 Redfern Av., Sale, Cheshire. Electrical Engineers, electrical installation contractors, etc. Cap.: £500. Dirs.: S. Rogerson and H. Butterworth.

A. J. Simmons and Sons (Seaford) Ltd. To take over business of builders, plumbers, heating and electrical engineers carried on as "A. J. Simmons and Sons" at 16 Dane Rd., 5 Broad St., and 96 Chichester Rd., Seaford, Sussex. Cap.: £7,000. Dirs.: A. J. Simmons and S. C. J. Simmons.

Walder and MacCreadie Ltd., The Garage, Lewes Rd., Lindfield. Motor, agricultural, electrical, mechanical, general and civil engineers, etc. Cap.: £5,000. Directors: F. S. Walder and Grace N. Walder, C. MacCreadie and Vera J. MacCreadie, P. A. Walder and Alva M. Walder.

MEETING TO NOTE

WEDNESDAY, AUG. 6

A.S.E.E. (N. London Branch).—"Modern Installations in Large Buildings." W. F. Parker. Three Jolly Butchers Hotel, Wood Green, N.22.—8.15 p.m.

...WHICHEVER YOU PREFER

HENLEY LEAD SERVICE BOXES are pressed from extruded lead sheet. The two halves of the box have specially designed flanges. These form a joint that can be easily wiped, with the minimum amount of plumber's metal, and provide an effective seal. Ample space for jointing. Available in various sizes to take normal main and service cables.

HENLEY COPPER SERVICE BOXES are pressed from tinned copper sheet and are equivalent in design and sizes to the Henley Lead Boxes. The gland entries are scored to assist the jointer in "dressing down."

HENLEY SERVICE BOXES

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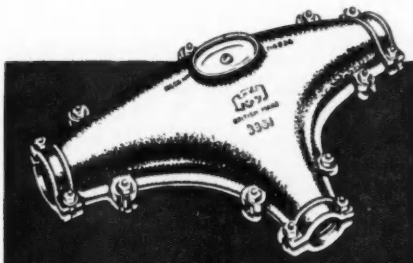

HENLEY CAST IRON BOXES are suitable for use with the Lead or Copper Service Boxes. They provide ample mechanical protection.

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED . FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF PETERBOROUGH

THE COUNCIL invites tenders from recognised electrical contractors for the ELECTRIC LIGHTING and POWER INSTALLATIONS to 50 permanent houses on the Dogsthorpe North Estate, Peterborough.

Drawings, specifications and forms of tender may be obtained on application to F. J. Smith, M.B.E., A.M.I.C.E., City Engineer and Surveyor, Town Hall, Peterborough.

Applications, before noon on Saturday, August 9, 1952, should be accompanied by a cheque for the value of £2 2s. made payable to the Peterborough City Council, which will be returned on receipt of a bona fide tender or the return of the documents.

The Council does not bind itself to accept the lowest or any tender.

C. PETER CLARKE,
Town Clerk.

Town Hall, Peterborough.
July 22, 1952. (A 514)

CITY OF MANCHESTER

THE CHILDREN'S COMMITTEE invite tenders for ELECTRICAL INSTALLATION required at "Ellerslie," Suffolk Road, Bowdon, Cheshire. Specification and drawings may be obtained from the City Architect, Town Hall. Deposit £1 1s. (returnable). Tenders sealed in endorsed envelopes must be delivered before 10 a.m. on Monday, August 18, 1952.

PHILIP B. DINGLE,
Town Clerk.

July 22, 1952. (A 496)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

GOVERNMENT OF KUWAIT

SHIFT CHARGE ENGINEER

APPLICATIONS are invited for an appointment as Shift Charge Engineer with the Government of Kuwait for a Water Distillation Plant and Power Station now being erected in Kuwait, Persian Gulf. In the first instance the Distillation Plant will be capable of distilling one million gallons of water per day from sea water and the Power Station will have a total capacity of 30,000 kW. Applicants should have at least three years' experience in a similar position and for men of suitable experience a commencing consolidated salary of £1,600 per annum is offered. Free furnished accommodation, when available, will be provided in addition to the salary, but State employees are required to pay for their own messing and servants. In the first instance the term of service will be one year and if satisfactory, the Contract may be extended a further two years. The rate of leave for the last two years will be sixty days per year of service. Applications in writing giving full particulars of training, qualifications and experience should be addressed in the first instance to the Secretary, Ewbank and Partners Limited, Engineering Consultants, 10/11 Grosvenor Place, London, S.W.1. (A 489)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

ENGINEERING DRAUGHTSMAN (ELECTRICAL), Divisional Headquarters, Kingston. Technical training up to National Certificate required. Preference given to those with experience of cable and switchgear layout in power stations. Experience in preparation of diagrams an additional advantage. Schedule "D," Grade 6, £413 to £547 p.a. plus London Allowance.

ASSISTANT SHIFT CHARGE ENGINEER, Brighton "B" Power Station. Technical qualifications equivalent to Graduate Membership of either the Institution of Mechanical or Electrical Engineers required. Responsible experience in the operation of modern high-pressure power station plant and a good knowledge of efficient operation of boiler and turbine plant essential. Class "J," Grade 9, £699 p.a. N.J.B. conditions of service for both positions.—Applications on forms obtainable from Establishments Officer, B.E.A., S.E. Division, Lower Ham Road, Kingston-on-Thames, Surrey, should be received by August 11. (A 515)

YORKSHIRE ELECTRICITY BOARD

No. 6 (Hull) Sub-Area

APPLICATIONS are invited for the following appointment:—

SALES SPECIALIST ENGINEER
(Hull District) (Vacancy No. 86/52)

Applicants should have had a wide practical experience of electrical installation work in commercial, domestic and industrial premises. They must be competent to advise consumers in particular on lighting installations.

Preference will be given to candidates who are members of the Institution of Electrical Engineers or who hold equivalent qualifications.

Salary, N.J.B. Agreement, Class "H," Grade 8, £697 to £726 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than August 15, 1952. (A 506)

LONDON ELECTRICITY BOARD

SUB-AREA TESTING ENGINEER

APPLICATIONS are invited for the above position in the Northern Sub-Area Meter and Testing Branch based at Hackney, E.8.

Applicants must have the following qualifications and experience:—A thorough theoretical and practical training with technical qualifications equivalent to the standard of Corporate Membership of the I.E.E., actual membership of which will be an advantage. A wide knowledge and experience in the testing, commissioning and routine maintenance of protection equipment associated with H.V. switchgear and transformers. Be capable of conducting investigations on existing transformers and distribution networks, and be competent to calculate and prepare data on system short circuits in order to obtain protective relay settings. A thorough knowledge and experience in the use of H.V. testing equipment and of cable fault location and a knowledge and experience of automatic telephones. Some knowledge of electronics would be an advantage.

The post is graded under Schedule A of the National Joint Board agreement as Class "K," Grade 7—£886 4s. per annum rising to £925 1s. per annum, inclusive of London Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad St., E.C.2, to be returned duly completed within 7 days from the appearance of this advertisement. Please enclose addressed foolscap envelope and quote ref: V/1500/T on all correspondence. (A 527)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF
GENERAL ASSISTANT ENGINEER (INSTALLATIONS)
Sub-Area Consumers' Engineer's Department—Blackburn

APPLICANTS should have experience in supervision of installation of wiring, switchgear, motors, plant and lighting in industrial and commercial premises and public buildings. Experience in the preparation of specifications and estimates an advantage.

Salary scale: £532-£553 p.a. Grade J.13. N.J.B. conditions.

APPOINTMENT OF
GENERAL ASSISTANT DISTRICT ENGINEER
Burnley District

The duties will include assistance in the operation, maintenance and construction of substations and h.v. and l.v. u/g. and o/h mains, fault location and the general maintenance of supply in the district. Preference given to applicants who are graduate members of the I.E.E. or who hold the H.N.C. in electrical engineering.

Salary scale: £528-£545 p.a. Grade F.11. N.J.B. conditions.

Applications for the above posts to Sub-Area Manager, No. 5 Sub-Area, the North Western Electricity Board, Jubilee Street, Blackburn, by August 9, 1952.

APPOINTMENT OF
JUNIOR ENGINEERS (TECHNICAL DEPARTMENT)
Sub-Area Headquarters, Kendal

Duties will include routine maintenance and testing, commissioning of new equipment, h.v. testing and fault localisation.

Salary scale: £375-£496 p.a. Grade H.17/14. N.J.B. conditions.

Applications to Sub-Area Manager, No. 6 Sub-Area, The North Western Electricity Board, Castle Green, Kendal, by August 9, 1952.

APPOINTMENT OF
SECOND ASSISTANT ENGINEER (SYSTEM PLANNING)
Sub-Area Technical Department—Hazel Grove

Applicants should have had good practical experience in construction, operation and design of u/g and o/h distribution systems, including sub-stations for voltages up to 33 kV. Preference given to holders of H.N.C. in electrical engineering.

Salary scale: £704-£733 p.a. Grade G.7. N.J.B. conditions.

Application forms can be obtained from the Sub-Area Manager, No. 7 Sub-Area, the North Western Electricity Board, Electricity Offices, Chapel Street, Hazel Grove, Cheshire, and must be returned to him by August 16, 1952. (A 502)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above position in the Hackney/Stoke Newington District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate standard, preferably being corporate members of the I.E.E., and possess a practical experience of all branches of engineering work associated with the organisation of a District Distribution Department particularly in regard to mains and sub-stations work on d.c. and a.c. systems.

The post is graded under Schedule A of the National Joint Board agreement as Class "F," Grade 10, £584 17s. per annum, rising to £606 18s. per annum, inclusive of London Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad St., E.C.2, to be returned completed by August 16, 1952. Please enclose addressed foolscap envelope and quote ref: V/1499/T. (A 526)

GOVERNMENT OF IRAQ

ELECTRICAL AND MECHANICAL ENGINEER required by Basrah Port Directorate for one year in first instance. Commencing salary according to qualifications and experience in scale I.D.90 rising to I.D.110 a month. Cost-of-living allowance between I.D.10 and I.D.14 a month according to dependants. (Iraqi dinar, £1.) Provident Fund. Free passages. Liberal leave on full salary. Candidates must possess a Higher National Certificate in Electrical or Mechanical Engineering or equivalent. They must have a knowledge of diesel engines, experience with a concern generating and supplying electricity and experience in the operation and maintenance of a power network.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents, 4 Millbank, London S.W.1, quoting on letter M.29180.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (A 497)

GOVERNMENT OF KUWAIT

DIESEL POWER STATION SUPERINTENDENT

APPLICATIONS are invited for an appointment as Diesel Power Station Superintendent with the Government of Kuwait, Persian Gulf. The minimum technical qualification is the Higher National Certificate in Technical Engineering or its equivalent. Applicants, aged between 30 and 35 years, should have had good experience in diesel generating stations, in an administrative position, and be capable of supervising maintenance and operating the station at the highest possible efficiency. Applicants should have some electrical knowledge, and experience of steam power plant would be advantageous, as at a later date, the steam power station is to be commissioned and, if suitable, a transfer could be arranged. The salary offered is up to £1,650, according to experience. Free furnished quarters and medical attention are provided. The first year will be probationary and home leave will be granted at the end of two years' service. Married accommodation cannot be promised during the first year of service.—Applications, in writing, giving full particulars of training, qualifications and experience, should be addressed, in the first instance, to the Secretary, Ewbank and Partners Ltd., Engineering Consultants, 10/11 Grosvenor Place, London S.W.1. (A 519)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following positions:

S/13.333—DEPUTY STATION SUPERINTENDENT, Poole Generating Station, Dorset

Applicants should preferably be Corporate Members of a recognised professional institution, and have had a wide experience in the operation, maintenance and administration of a large modern generating station. Housing accommodation is available.

Salary, N.J.B. Class "H," Grade 3, £1,010 to £1,057.

S/13.332—SHIFT CHARGE ENGINEER, Earley Generating Station, Reading

Applicants should preferably be in possession of technical qualifications admitting to Corporate Membership of a recognised professional institution, have had previous experience in a large modern generating station, and preferably have had experience of a station with high temperatures and pressures and pulverised fuel equipment. Manufacturing works experience will be an advantage.

Salary, N.J.B. Class "G," Grade 7, £704 to £733.

Application forms, obtainable from P. D. A. Oliver, Divisional Secretary, British Electricity House, 111 High Street, Portsmouth, must be returned by August 13, 1952. (A 520)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following Superannuable posts. National Joint Board salaries and conditions.

JUNIOR ENGINEERS

(a) Cliff Quay Generating Station

Salary Class "J," Grade 18, £375 to Grade 14, £524 per annum.

(b) Norwich Generating Station

Salary Class "F," Grade 15, £375 to Grade 14, £447 per annum.

The duties of the successful applicants will include assisting in the Control Room on shift, and other operational and investigational duties. Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in electrical engineering or its equivalent.

Applications, stating age, qualifications and experience, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by August 9, 1952.

W. N. C. CLINCH,
Controller.
(A 504)

SOUTH EASTERN ELECTRICITY BOARD

ENGINEERING DRAUGHTSMAN
Surrey Sub-Area Engineering Department, Dorking

SALARY £413 to £547 under Schedule "D," Grade 6 of N.J.B. Agreement. Superannuable. Duties include detailed layout of indoor and outdoor substations, together with switch and control gear, wiring diagrams and general network diagrams and plans.

Applications, giving two referees, on forms obtainable from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBoard, Rough Rew, Horsham Road, Dorking, to be returned to him, through an Employment Exchange, by August 11, 1952.

A. L. BURNELL,
Secretary.
July 1952. (A 505)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified engineers for the following positions in this Division:

SHIFT CHARGE ENGINEER
Lincoln. Vacancy No. 70/52

Applicants should have had a sound training and considerable practical experience in power station operation. The possession of a Higher National Certificate in Mechanical or Electrical Engineering, or its equivalent, will be an advantage.

The salary will be in accordance with Class "F," Grade 7 (£677 to £696 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: August 11, 1952.

BOILER HOUSE SHIFT CHARGE ENGINEER
North Wilford Power Station, Nottingham
Vacancy No. 72/52

Applicants should have had a sound technical training, a good general engineering experience and a knowledge of the control and operation of large pulverised fuel boilers and associated equipment. Preference will be given to candidates who are in possession of technical qualifications admitting to Corporate Membership of a recognised professional institution.

The salary will be in accordance with Class "K," Grade 9 (£741 to £771 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: August 18, 1952.

The above positions are pensionable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Application forms, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, should be submitted to the undersigned. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(A 516)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY NO. 766—THIRD ASSISTANT ENGINEER at No. 3 Sub-Division, situated at Trafford Generating Station, Manchester. Applicants must have extensive knowledge of steam power plant and associated instruments, especially automatic boiler control systems, and should possess H.N.C. in mechanical or electrical engineering. Salary £629-£834 (N.J.B. AX/DX 5).

Vacancy No. 767—SHIFT CHARGE ENGINEER, Radcliffe Generating Station, nr. Manchester. Salary £677/£696 (N.J.B. F.7).

Apply, quoting vacancy No. to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, not later than August 9, 1952. (A 503)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Schedule "A."

STATION SHIFT CONTROL ENGINEER—
Battersea Generating Station

Sound engineering training, with technical qualifications of Higher National Certificate standard, followed by experience with the operation of a Control Room in a modern power station. Salary, Class "L," Grade 10, £778 1s. per annum.

JUNIOR ENGINEER (3.3 kV Switchboard)
Battersea Generating Station

Sound engineering training with technical qualifications of at least Ordinary National Certificate standard, followed by some experience in a modern power station. Salary, Class "L," Grade 16, £531 6s. p.a.

ASSISTANT SHIFT CHARGE ENGINEERS—
Blackwall Point Generating Station

Sound technical training with practical experience in the operation of a modern generating station, preferably with P.F. firing equipment. Salary, Grade "F," Grade 9/1, £616 7s. p.a.

INSTRUMENT ENGINEER—
Lombard Road Generating Station

Good knowledge of generating station instruments maintenance. Duties include assisting in compilation of operation returns for which suitable educational standard required. Salary, Class "F," Grade 13, £471 p.a.

Applications, stating age, qualifications and experience to Divisional Secretary, B.E.A., London Division, Ergon House, Horseferry Road, S.W.1, within 14 days of this advertisement. (A 518)

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER required in the Wolverhampton District of the Wolverhampton and District Sub-Area. Experience necessary in contracting, estimating, consumer services and apparatus reconditioning. Salary £476 to £494 per annum (N.J.B. Grade "G.13." Progression to Class "H," with retrospective effect to 1.4.52 is probable).

Apply in writing within 14 days, stating age, experience, present salary and position, to Mr. F. J. Elliott, Manager, Midlands Electricity Board, 83 Darlington Street, Wolverhampton.

A. STEPHENS,
Secretary.
(A 521)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

ASSISTANT SECTION ENGINEER required for Connah's Quay Section (North Wales) of the Transmission Department. Salary £564 to £700. N.J.B. Class "AX," Grade 6. Superannuable.

Applicants should possess a recognised degree in electrical engineering or equivalent qualifications, and have had experience in the operation, maintenance and commissioning of 132 kV switchgear, transformers, cables, overhead lines and associated equipment.

Application forms from the Divisional Secretary, Beaconsfield Road, Woolton, Liverpool. Closing date August 15, 1952.

W. A. GALLON,
Divisional Controller.
(A 517)

ASSISTANT DESIGNER DRAUGHTSMAN required by electrical switchgear manufacturers in Devon. Age 25-30, with good technical, mechanical and practical knowledge of medium voltage metal-clad switchgear. Applicants must have ability and should have Higher National Certificate or equivalent qualifications. Permanent and progressive position. Starting salary commensurate with experience and qualifications.—Box No. 1695, Electrical Times. (A 442)

BRITISH ELECTRICITY AUTHORITY require INSTRUMENTS ENGINEER in the Research Laboratories at Leatherhead. Candidates should have a university degree, H.N. Certificate in electrical engineering, or equivalent qualification. Some knowledge of instrument design is required and practical ability in the repair and maintenance of delicate electrical and physical instruments is essential. Salary, N.J.B. Grade 4, £697 to £909, Grade 5 £511 to £709. Pension scheme.

Applications, which will be acknowledged, to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, W.1, by August 25, 1952. Quote reference AE/269. (A 507)

DRAUGHTSMAN used to boiler plant and industrial pipe installations of all classes, able to take own dimensions at site. State age, experience and salary required. Pension scheme.—The Brightside Foundry and Engineering Co., Ltd., 17 Summer Row, Birmingham 3. (A 471)

EWBANK AND PARTNERS LTD. have the following vacancies for Engineers in their London office:

(a) QUALIFIED CONTRACTS ENGINEERS, who have had a good mechanical training and experience in the design and operation of large steam power plants and associated equipment. Applicants must be competent to prepare specifications, estimates and contract documents, and to take charge of large engineering contracts from the design stage through to the completion of the work at site. Some electrical experience will be an advantage.

(b) FIRST ASSISTANT TECHNICAL ENGINEER for the Investigation and Testing Department. Applicants must possess an Honours Degree in Mechanical Engineering or Physics and have had experience in the operation and testing of large power plants. Preference will be given to engineers who have had experience in the project design of plants for the supply of power, steam and other services.

(c) SECOND ASSISTANT TECHNICAL ENGINEER, who must possess an Honours Degree in Mechanical Engineering or Physics. Preference will be given to engineers who have had experience in instrumentation and automatic control and technology as applied to industry and power plants. A knowledge of power plant operating, testing or design is also required.—Applications, giving age and full details of experience and qualifications, should be addressed to the Secretary, Ewbank and Partners Ltd., Engineering Consultants, 10-11 Grosvenor Place, London S.W.1. (A 522)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

ELECTRICAL SALES ENGINEER required for Malaya by progressive company specialising in general electrical engineering lines. Applicants must have had sound electrical engineering training and also sales organising ability essential. Salary according to experience.—Write, Box Z.F.979, Deacon's Advertising, 36 Leadenhall Street, E.C.3. (A 509)

EXPERIENCED SENIOR TECHNICAL SALES ENGINEER required to take over considerable turn-over in London and the Home Counties for M.V. switchgear including full range heavy duty H.R.C. fuse switches to 800 amps, distribution boards, all types M.V. switchboards, substation switchboards, full range rewireable industrial and domestic switch and fusegear. Good salary, commission and expenses, excellent prospects for keen man to work on own initiative directly responsible to Managing Director. Send full particulars, which will be treated in complete confidence.—G. P. Dennis Ltd., Fleming Road, Speke, Liverpool. (A 530)

IMPERIAL CHEMICAL INDUSTRIES LIMITED invite applications for the following vacancies:—

SENIOR ASSISTANT ENGINEER (GENERATION) P/1. Applications are invited for the position of additional Senior Assistant Engineer in the Generation Section of the Company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the Generation Section Manager in the headquarters of the department, with the operation and maintenance of the Division's power stations, which have an installed capacity of more than 100,000 kW, and with the design of extensions thereto. Applicants, who should be between the ages of 30 and 38 years, and should hold a Degree in Mechanical or Electrical Engineering, must have had a sound mechanical engineering training and should have had considerable experience of the operation and maintenance of large modern high-pressure steam power stations. In addition, they should have had some experience of the preparation of designs and specifications for new plant and of investigations and tests in connection therewith, while Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers is also desirable. The commencing salary will not be less than that given in N.J.B. Schedule "C." for Grade 1, Class "CX," headquarters staff. The selected candidate will be required to pass a medical examination and to join the Company's pension fund.

SENIOR ASSISTANT ENGINEER (MECHANICAL) P/2 Applications are invited for the position of additional Senior Assistant Engineer in the Mechanical Section of the Company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the Mechanical Section Manager in the headquarters of the Department, with the maintenance of the mechanical equipment of the Division's power stations, which have an installed capacity of more than 100,000 kW, and with the design of extensions thereto. Applicants, who should be between the ages of 30 and 38 years, and should hold a Degree in Mechanical Engineering, must have had a sound mechanical engineering training and should have had considerable experience of the maintenance and design of the mechanical equipment of large modern steam power stations. In addition, they should have had some experience of the preparation of designs and specifications for new plant and investigations and tests in connection therewith, while Corporate Membership of the Institution of Mechanical Engineers is also desirable. The commencing salary will not be less than that given in the N.J.B. Schedule "C." for Grade 2, Class "CX" headquarters staff. The selected candidate will be required to pass a medical examination and to join the Company's pension fund.

Applications, in writing, giving age and full particulars of education, technical qualifications, engineering training and power station experience, should be sent to the Staff Manager, Imperial Chemical Industries Ltd., General Chemicals Division, Cunard Building, Liverpool 3, quoting reference P/1 or P/2 as appropriate. (A 508)

LEADING cooker and appliance manufacturer requires QUALIFIED DEMONSTRATOR for Southern England.—Apply Box No. 1915, Electrical Times. (A 523)

METER manufacturers, N.W. London, require SENIOR and JUNIOR TEST ENGINEERS. State education, technical training, experience, salary required.—Box No. 1899, Electrical Times. (A 473)

KUWAIT OIL COMPANY requires TECHNICAL INSTRUCTORS for Training Division in Kuwait as follows:

(a) 1 Technical Instructor in General Engineering Fitting.
(b) 1 Technical Instructor in Engine Fitting.
(c) 1 Technical Instructor in Diesel Fitting.
(d) 1 Technical Instructor (Electrical).

Applicants for (a), (b) and (c) must have full recognised mechanical engineering apprenticeships and for (d) a full recognised electrical apprenticeship. Ordinary National Certificate is required in all cases and at least 5 years' experience as a master tradesman. Preference given to candidates with previous experience as instructors. Age 32-40. Salary in all cases starting £710 per annum clear plus generous allowances, pension scheme and kit allowance. Write for application form, giving personal details and quoting appropriate reference: (a) K.1554; (b) K.1562; (c) K.1556; (d) K.1555 to Box M.26 at 191 Gresham House, E.C.2. (A 510)

REQUIRED for Middle East. PLUMBER JOINTER experienced in jointing paper insulated cables, lead covered and armoured, up to 11 kV.—Apply, stating age and experience. Forward copies of testimonials or state names to whom we may apply to Box No. 1911, Electrical Times. (A 511)

RESEARCH ENGINEER. Technical training to B.Sc. (Eng.) standard or similar for research Water Heating Apparatus, Domestic Electric Appliances, Thermal Devices, etc. Previous works experience indispensable, with wide knowledge covering metal working, soldering, brazing and welding. Knowledge of testimonials or state names to whom we may apply to Box No. 1911, Electrical Times. (A 511)

SALES ENGINEER required by leading manufacturer of motor control gear. Must possess electrical degree and have had considerable experience in selling starters, contactors and relays. The position is for a Senior Executive and has excellent possibilities.—Write stating full particulars of experience and salary required to Box No. 1917, Electrical Times. (A 529)

SENIOR ELECTRICAL DRAUGHTSMAN required for modern London office; preferably with experience of power distribution and lighting installations as applied to chemical and oil refinery plants. Qualifications to H.N.C. standard. Good conditions, 5-day week, pension scheme.—Write full particulars, age, qualifications and experience to Box No. 6017, c/o Charles Barker and Sons, Limited, 31 Budge Row, London, E.C.4. (A 454)

TECHNICAL SALES ENGINEERS are required in a number of areas as Branch Representatives. Applicants must have had sound technical education, and apprenticeship with reputable electrical manufacturers or equivalent practical training, preferably to A.M.I.E.E. standard. Some commercial experience would be an advantage. Age limit approximately 28-35. Permanent position, good pension scheme, ample scope and prospects are offered to men of keen intellect and initiative, and able to work with a minimum of direction but backed by the resources of a large organisation whose products are employed throughout the electrical manufacturing industry.—Write, giving personal particulars, details of qualifications and experience, and order of salary expected, to Box No. 1903, Electrical Times. (A 491)

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APPOINTMENTS WANTED

ENGINEER, 43, University degrees electrical and mechanical engineering, 13 years' management experience, production, exports, wide continental experience, five languages, travelled; highest references.—Box No. 1907, Electrical Times. (A 498)

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A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 5566 (4 lines) —Service Electric Co., Ltd., Stanmore, Middx. (A 19)

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WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London, N.1. (A 7)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

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DIESEL ALTERNATOR SETS in stock up to 500 kVA. 400/440 V, 3-phase, 50 c/s, 4-wire. Detailed stock list post free on request.—Thos. W. Ward Ltd., Albion Works, Sheffield. Tel. 26311 (ext. 347). (A 482)

MOTOR GENERATOR SETS built to customers' requirements from new and/or modern reconditioned machines. Guaranteed for twelve months. Good deliveries, competitive prices.—Enquiries to Thos. W. Ward Ltd., Albion Works, Sheffield. Tel. 26311 (ext. 347). (A 483)

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A.C./D.C. MOTOR GENERATOR SET by B.T.H., comprising 92-h.p. slip-ring motor, 200/3/50, running at a speed of 580 r.p.m., direct coupled to one 60 kW, 100 V, 600 amps d.c. generator. Protected type frame with end shield ring oil bearings. Mounted on channel bedplate.

George Cohen, Sons and Co., Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070 and Stanningley, near Leeds. Tel.: Pudsey 2241. (A 501)

360 kW (400 kVA) Bruce Peebles ALTERNATOR for direct coupling; 400/3/50, 0·9 PF, 600 r.p.m., complete with direct-coupled exciter and Brush switchboard with a.v.r., etc. New 1948.—Burrill, 109 Pencisely Road, Llandaff, Cardiff. Tel.: Llandaff 95. (A 427)

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100 kW direct-coupled Motor Generator Set, on combined baseplate, comprising new 150 h.p. "Brook" screen-protected slip ring motor, 400/440 V 3-phase, 50 cycles, direct coupled to modern 100kW "Mawdsley" drip-proof compound wound generator, 440/220 V, 3-wire, 960 r.p.m.: ball and roller bearings throughout. With oil-immersed a.c. control gear, generator switchboard incorporating static balancer.

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A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7322. (A 6)

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10.7 kVA PLATING RECTIFIER UNIT by Westinghouse; 400/3/50; output 8 V 1,000 amps; unit in sheet steel cubicle. Floor fixing.

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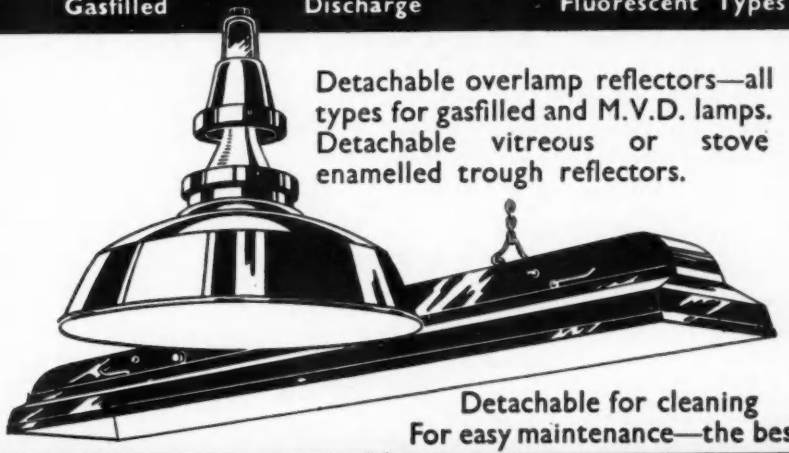

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Enlarged 1952 Edition

A comprehensive list of principal officers throughout the supply industry in the United Kingdom, particularly the B.E.A., the Divisions and Area Boards, also the N. of Scotland Hydro-Electric Board. Completely revised up to January 1, 1952. A new feature in this edition is a section giving the **Supply Voltages** of the principal towns and villages in the U.K. Standard domestic tariffs also given.

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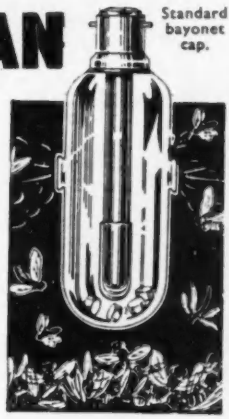

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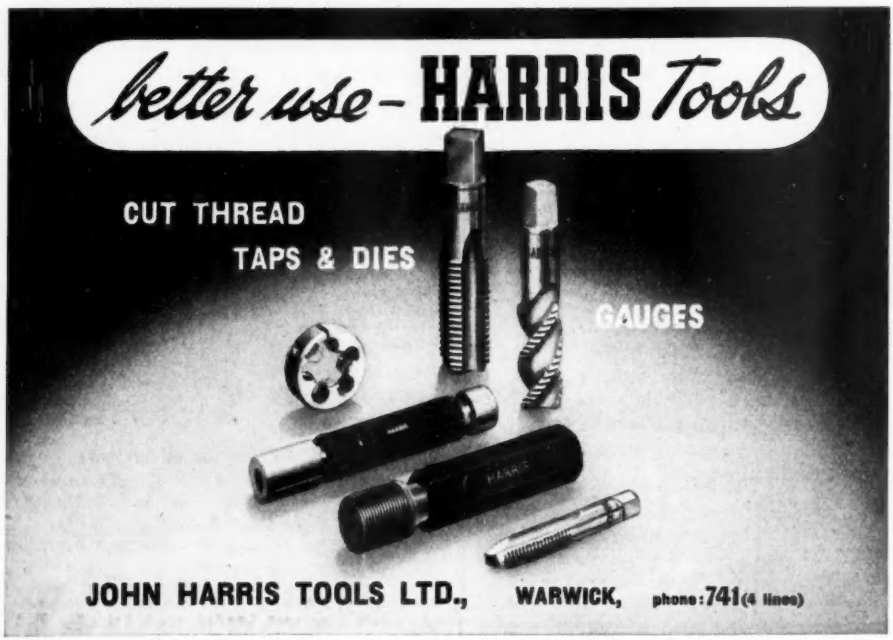

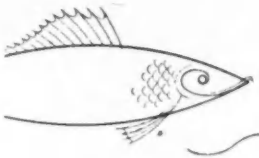

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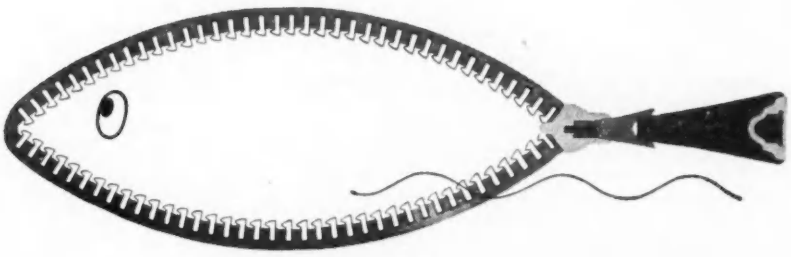

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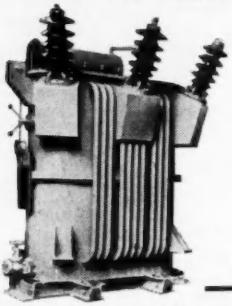

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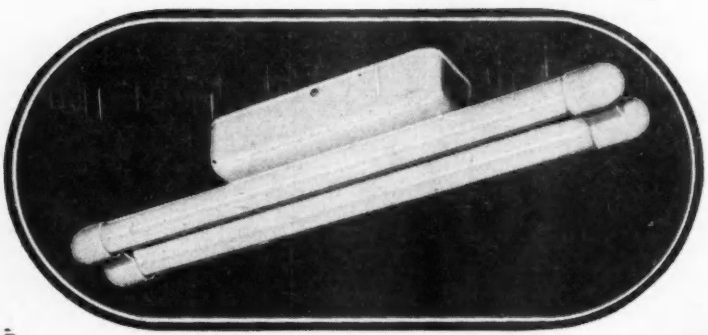

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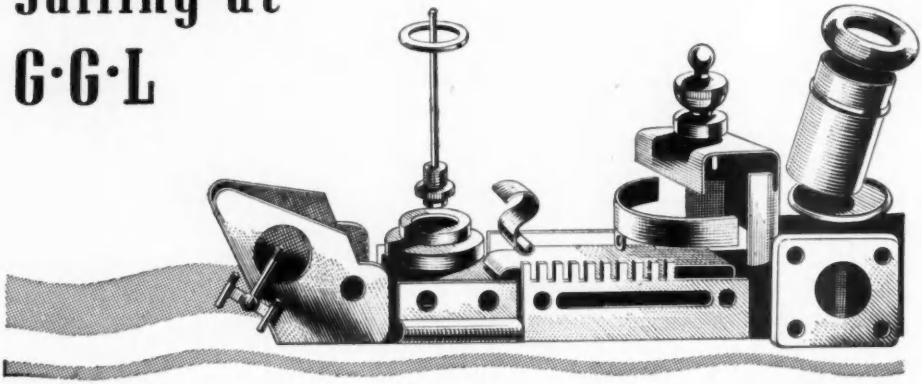

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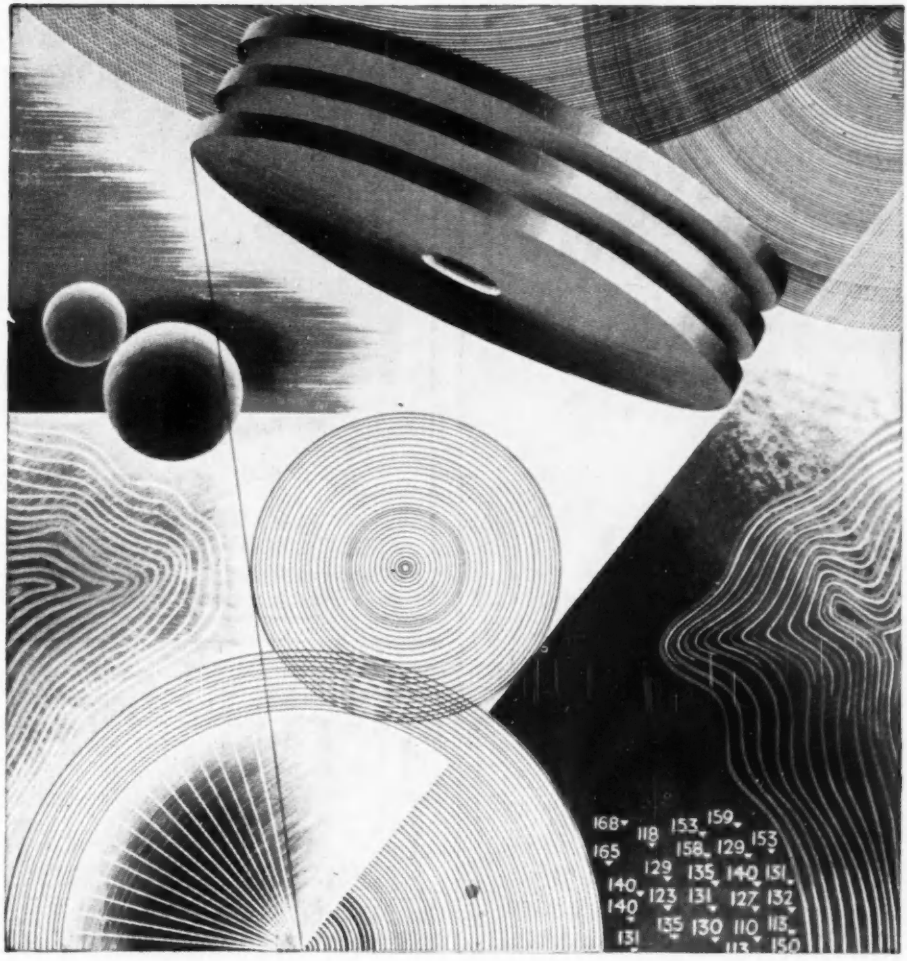

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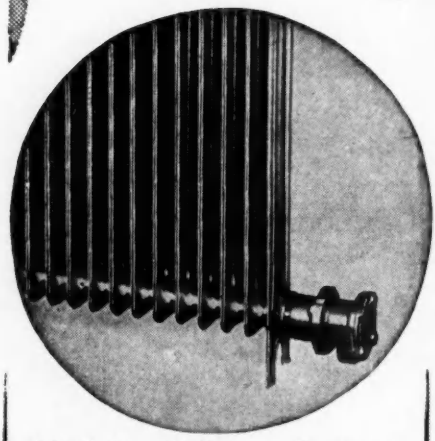

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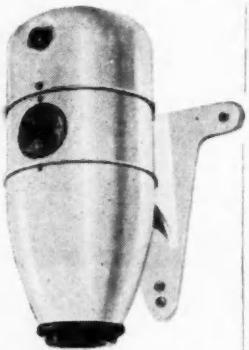

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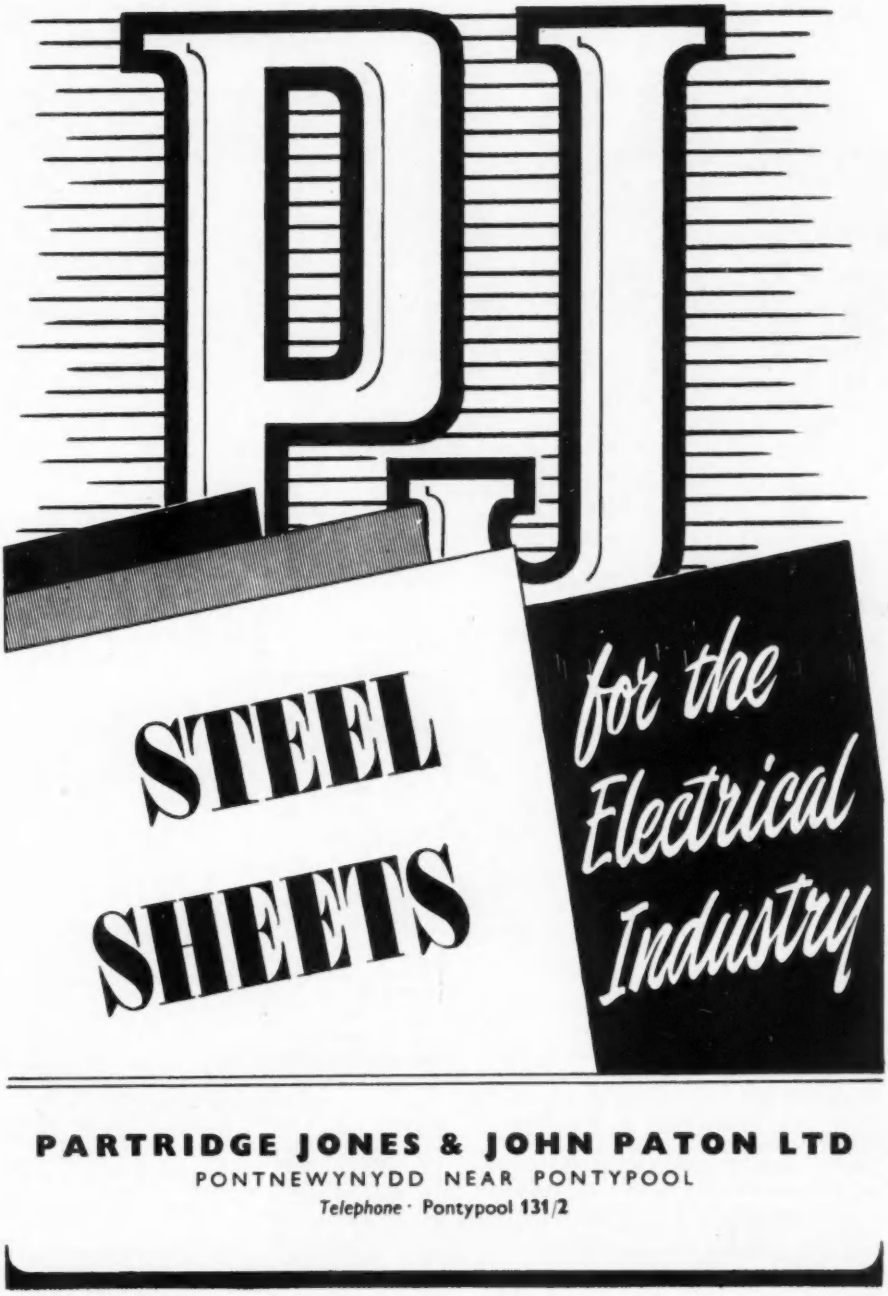

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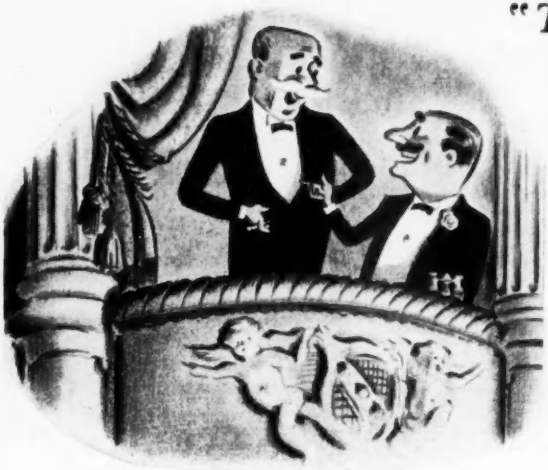

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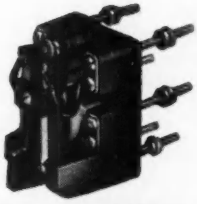

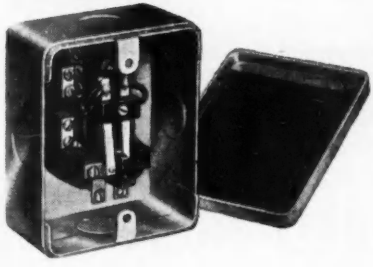

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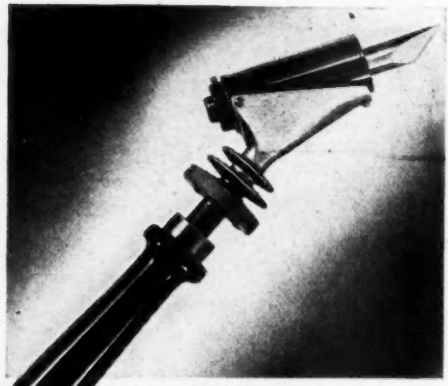

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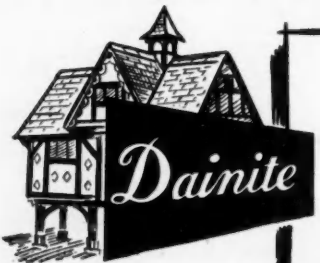

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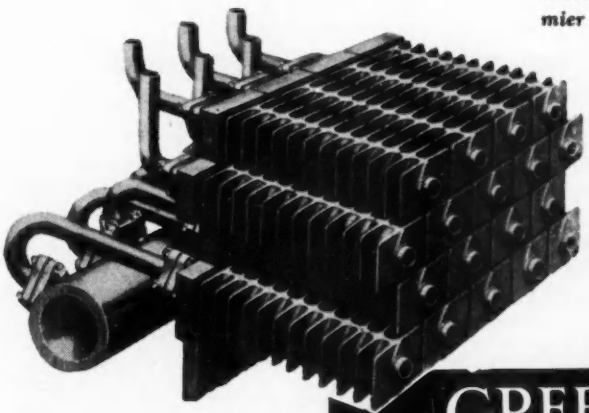

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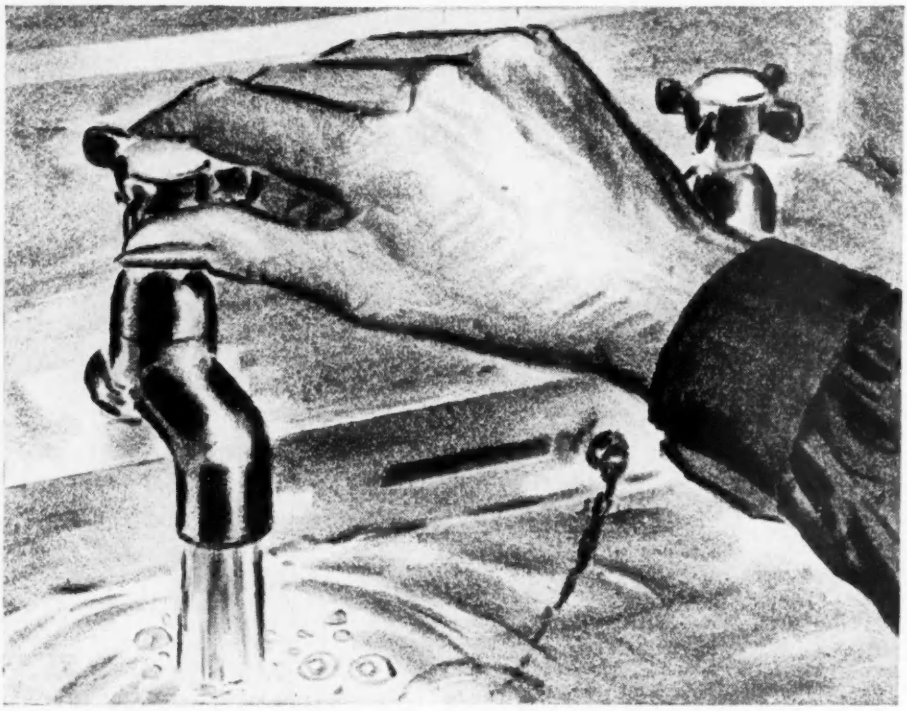

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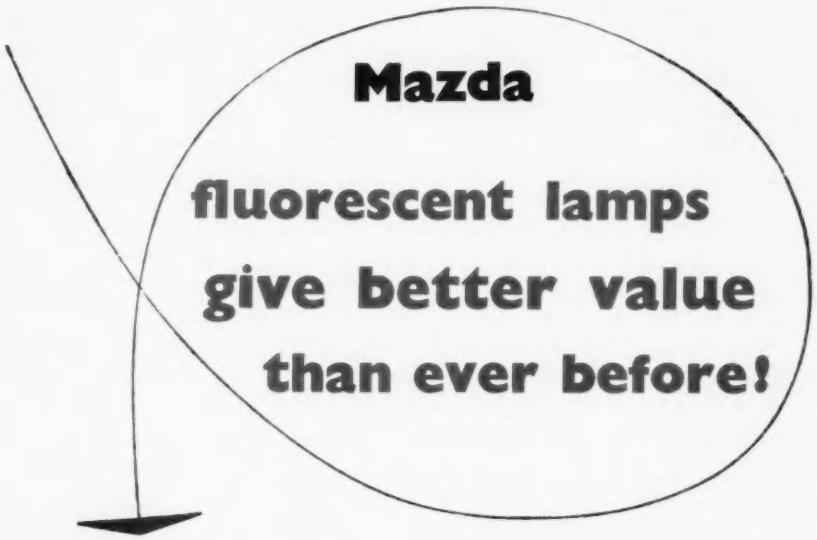

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These lamps are manufactured by the British Thomson-Houston Co. Ltd., who, over the past forty years, have achieved world wide renown as leaders in improved lamp quality. The research and manufacturing resources behind every Mazda lamp have also been responsible for such other major engineering achievements as the production of the first jet engine of Whittle design, the first gas turbine engine used to propel an ocean-going merchant ship, and the electrical power system of the new Comet jet airliner.

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